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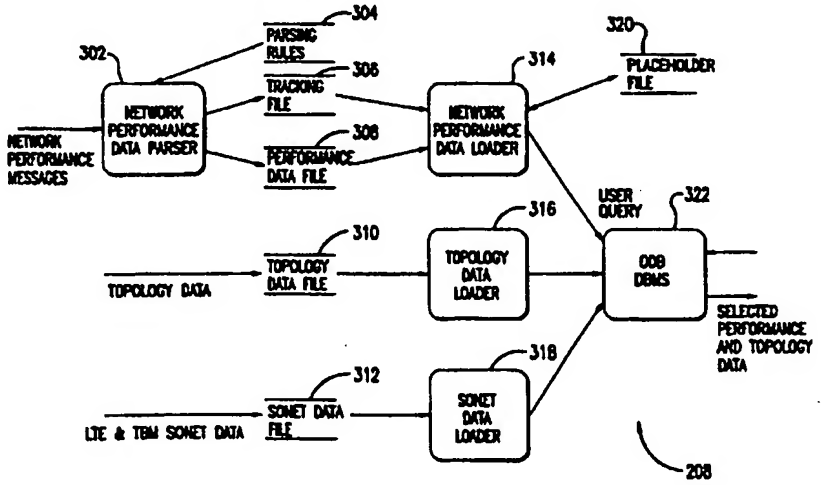

(57) Abstract

A system and method for storing and retrieving performance and topology information of a telecommunications network. A network performance data parser (302) receives network performance data messages in real time, parses the messages according to parsing rules (304), reformats the messages according to the parsing rules, and writes out the reformatted messages to a performance data file (308). A network performance data loader (314) retrieves the reformatted messages from the performance data file and loads them into an open database management system (322). A topology data loader (316) retrieves weekly network topology data from a topology data file and loads it into the open database management system.A sonet data loader (318) retrieves daily network sonet data from a sonet data file (312) and loads it into the open database management system. The open database is easily accessible via any SQL interface.

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A System and Method for Storing and Retrieving Performance and Topology Information

Background of the Invention

Field of the Invention

This invention relates generally to telecommunication networks, and more specifically, to provide trending analysis of a telecommunications network by monitoring network performance and topology information that spans days, weeks and months.

Related Art

A typical telecommunication network comprises multiple telecommunication switches located throughout a geographical area. When a customer makes a call, the call may be routed through one or more switches before reaching its destination. It is imperative that the network operate reliably and efficiently to ensure high quality network services and customer satisfaction.

The monitoring and maintenance of a telecommunications network is compounded by the fact that the number of network customers is continually increasing. Current network customers are using the network in new ways including access to Internet and the Wide World Web. Additionally, networks are continually expanding into new areas to reach new customers. Therefore, the volume of data transmitted over a telecommunications network is continually increasing along with the number of required monitoring points. A monitoring point is a location in the telecommunications network at which the network is being checked in terms of transmission errors, workload, and other performance statistics. As an example of the magnitude of this problem, there were over two (2) million monitoring points in the MCI telecommunications network at the end of 1995.

When monitoring a telecommunications network's performance, the network must be considered in its entirety. It is not sufficient to monitor a network in terms of individual segments because each segment of a network impacts the others. Therefore, monitoring network performance must include identifying trend analysis and root causes.

There are certain network conditions that can only be identified by trending analysis. For example, a bad Digital Cross Connect (DXC) 3/3 card may not be causing a problem that would show up on a real-time monitoring system. The bad card, however, would show up using long term trending analysis. Monitoring the trend of network performance over time identifies systemic problems in a particular manufacturer's product or indicates procedural problems in operating the network.

Contemporary network management systems do not provide complete or adequate network performance information. Typically, a management system provides a few report formats that contain limited performance information. The management system cannot provide trending analysis of network performance information that spans days, weeks and months. Additionally, contemporary systems do not combine network performance information with topology information. Therefore, network operators cannot correlate network performance with the placement of specific network devices.

The problem with contemporary network management systems is further evident when assisting in the testing of a customer's circuits prior to "turn-up." Turn-up occurs when a circuit has been provisional and has "live" data traffic. Without the availability of trending analysis, the testing of circuits is a manual intensive process. A system operator must monitor each circuit for several days. This procedure requires the operator to enter several circuit identifiers (as many as one hundred) each day for each circuit being monitored. After the monitoring is complete, the operator determines from the generated reports whether the circuit is ready to be "turned-up" for the customer.

Contemporary network management systems also collect and store performance data in a custom, internal format. That is, the systems do not store network information in an easily accessible standard format. By using a custom, internal format, the systems require custom application programs to be written to retrieve the performance data and present it in a meaningful format.

Therefore, there is a need for a telecommunications network monitoring system that provides both trending analysis and routine analysis. The monitoring system must support near-real-time, next day, and week-to-week analysis. Furthermore, both network performance and topology information must be incorporated into the same monitoring system. Therefore, the network performance information can be correlated with the topology information.

There is a further need for a telecommunications network monitoring system that provides an open and reliable collection point for network performance and topology information. Circuit availability and the percentage of error-free seconds can be monitored, thereby fulfilling tariff obligations and predicting problems prior to tariff impact.

There is still a further need for a telecommunications network monitoring system to provide a convenient and flexible means for the storage and retrieval of network performance and topology information. Easy and rapid access to such information assists network operators in monitoring the network in its entirety, as well as, in monitoring any specific monitoring point.

Summary of the Invention

The open database of the present invention solves the problems associated with contemporary network monitoring systems by providing a complete network monitoring system. The open database collects and stores network performance and topology information that spans days, weeks and months. Furthermore, the open database stores the network performance and topology information in a standard format. This allows easy access and retrieval of the information using commercial off-the-shelf software.

The open database receives three types of network information. First, network performance messages are sent in real time from multiple site controllers located throughout the telecommunications network. These messages are concentrated in a Single Local Support Element (LSE). The open database parses the performance messages as they are received from the LSE, performs any needed conversions, and translates the performance information into standard formatted records. The open database then loads the formatted records into the database management system (DBMS).

Second, the Light Terminating Equipment (LTE) and Transport Bandwidth Manager (TBM) devices send daily Synchronous Optical NETwork (SONET) messages to the DBMS. SONET messages provide performance information for the optical fiber transmissions on the public network. The open database loads these messages directly into the DBMS without the need for parsing or reformatting.

Third, the network Real Time Topology (RTT) system sends weekly topology messages to the open database. The topology messages provide information on the devices that comprise the network and on the configuration of the devices. The open database loads these messages directly into the DBMS without the need for parsing or reformatting.

The open database provides numerous advantages to network operators. Network operators have easy and rapid access to performance and topology information, thereby allowing the correlation of network performance to the

network topology. Operators can directly troubleshoot specific network devices. Examples of problems that can be found using the open database include: Digital System (DS) Circuit cable problems, multiplexer high speed card replacement, and lightwave transmitter replacement. Operators can also generate performance and time-of-day analyses for customer sites.

Additional features of this invention will become apparent from the following detailed description of the best mode for carrying out the invention and from appended claims.

Brief Description of the Figures

The present invention is described with reference to the accompanying drawings. In the drawings, like reference numbers indicate identical or functionally similar elements. Additionally, the left-most digit(s) of a reference number identifies the drawing in which the reference number first appears.

FIG. 1 is a block diagram of an exemplary computer system as used by the present invention;

FIG. 2 is a block diagram of an open database and the environment in which it operates;

FIG. 3 is a block diagram of the internal structure of the open database;

FIG. 4 is a control flow diagram representing the operation of a Network Performance Data Parser;

FIG. 5 is a control flow diagram representing the operation of Process Performance Message;

FIG. 6 is a control flow diagram representing the operation of Write Reformatted Performance Message to Performance Data File;

FIG. 7 is a control flow diagram representing the operation of Add Reformatted Message Data Records to Performance Data Files;

FIG. 8 is a control flow diagram representing the operation of Process Reload-Parsing-Rules Signal;

FIG. 9 is a control flow diagram representing the operation of a Network Performance Data Loader;

FIG. 10 is a control flow diagram representing the operation of Wait and Retrieve a Data Record from Performance Data File;

FIG. 11 is a control flow diagram representing the operation of Read a Data Record from the Performance Data File;

FIG. 12 is a control flow diagram representing the operation of Process Next Entry in Tracking File;

FIG. 13 is a control flow diagram representing the operation of a Topology Data Loader; and

FIG. 14 is a control flow diagram representing the operation of a Sonet Data Loader.

Detailed Description of the Preferred Embodiments

1. System Configuration

The preferred embodiment of the present invention is computer software executing within a computer system. FIG. 1 shows an exemplary computer system. The computer system 102 includes one or more processors, such as a processor 104. The processor 104 is connected to a communication bus 106.

The computer system 102 also includes a main memory 108, preferably random access memory (RAM), and a secondary memory 110. The secondary memory 110 includes, for example, a hard disk drive 112 and/or a removable storage drive 114, representing a floppy disk drive, a magnetic tape drive, a compact disk drive, a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as EPROM, or PROM), etc. which is read by and written to by a removable storage unit 116. Removable storage unit 116, also called a program storage device or a computer program product, represents a floppy disk, magnetic tape, compact disk, etc. As will be appreciated, the removable storage unit 116 includes a computer usable storage medium having stored therein computer software and/or data. The removable storage drive 114 reads from and/or writes to a removable storage unit 116 in a well known manner.

The computer system 102 may also include other similar means for allowing computer programs or other instructions to be loaded. Such means can include, for example, a communications interface 118. Communications interface 118 allows software and data to be transferred between computer system 102 and external devices. Examples of communications interface 118 can include a modem, a network interface (such as an Ethernet card), a communications port, etc. Software and data transferred via communications interface 118 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communications interface 118.

In this document, the term "computer program product" is used to generally refer to removable storage unit 116, a hard disk installed in hard disk drive 112, and signals transferred via communications interface 118. These computer program products are means for providing software to a computer system 102.

In an embodiment where the invention is implemented using software, the software may be stored in main memory 108, or in a computer program product and loaded into computer system 102 using removable storage drive 114, hard disk drive 112, or communications interface 118. The software, when executed by the processor 104, causes the processor 104 to perform the functions of the invention as described herein.

In another embodiment, the invention is implemented primarily in hardware using, for example, a hardware state machine. Implementation of the hardware state machine so as to perform the functions described herein will be apparent to persons skilled in the relevant arts.

The preferred embodiment of the present invention is directed to a computer system 102 comprising a Digital Alpha Server 8400 executing Digital UNIX. Furthermore, the preferred embodiment of the Digital Alpha Server 8400 includes 100 gigabytes (GB) of disk space with 512 megabytes (MB) of RAM. It should be understood, however, that the invention is not limited to this embodiment. Instead, the invention is described with reference to this computer system for convenience purpose only. Other computer systems could alternatively be used.

Additionally, the preferred embodiment of the present invention is directed to software. Preferably, the software package Sybase System II (Sybase) executes on the preferred computer system. Sybase is a relational database product that is commercially available and is accessible via an SQL interface. Pertinent aspects of Sybase are described in many publicly available documents, such as Purba, S., *Developing Client/Server Systems Using Sybase SQL Server System X1*, John Wiley & Sons, ISBN 0471153389 (1996), which is incorporated herein by reference in its entirety. It should be understood that the invention is

described with reference to Sybase for convenience purpose only. Other software packages could alternatively be used.

2. *Data Flow for the Open Database*

FIG. 2 is a level 0 data flow diagram illustrating the external interfaces of the open database. A data flow diagram represents how data is used among the components of a computer software application. A level 0 data flow diagram illustrates the highest level of data interfaces between a software application and external sources. Therefore, in the level 0 data flow diagram of FIG. 2, the computer software application being depicted is the open database 208 which is represented by the rounded-rectangle (or bubtangle). The LSE 202, PAVE 204, RTT 206, and ODB Clients 210 represent external sources of data that interface with the open database 208.

In a data flow diagram, the direction of an arrow connecting two objects represents the directional flow of data. For example, the Local Support Elements (LSE) 202 sends network performance messages to the open database 208. The PAVE 204 sends LTE and TBM sonet data to the open database 208. The RTT 206 sends topology data to the open database 208. The open database 208 receives and stores the network performance and topology information.

The ODB clients 210 have two data interfaces with the open database 208. First, ODB clients 210 send a user query to the open database 208 requesting for specific network performance and topology information. Second, the open database 208 returns to the ODB clients 210 the selected performance and topology data that matches the user query.

The single Local Support Element (LSE) 202 receives network performance information from multiple network site controller devices. Currently, there are approximately 200-300 site controllers located throughout the United States. The LSE 202 receives the performance information and sends it to the open database 208 in real time. There are ten (10) different types of network performance messages : generation 2 performance poll message -

ESFMU message, generation 2 performance poll message - CSU message, generation 2 performance nominal message, generation 2 performance poll message (crunched), generation 3 performance poll message (type 1 ESF circuit), Alcatel 1633 broadband DXC, DS3MU, E1MU, VC12, and SONET.

Example embodiments of the ten (10) network performance message formats discussed herein are further described in Table 1, below. Table 1 can be found in section 6 of the present specification and is self-explanatory. The embodiments of the network performance messages of the present invention comprise complete record formats. It would be apparent to one skilled in the relevant art to develop alternative embodiments for network performance messages comprising a different number of fields and different field definitions.

The PAVE 204 receives Synchronous Optical NETwork (SONET) messages from Light Terminating Equipment (LTE) and Transport Bandwidth Manager (TBM). The SONET messages contain daily summaries pertaining to performance information on the optical fiber transmissions on the network. The PAVE 204 receives the SONET messages and sends them to the open database 208 daily. There are nine (9) different types of SONET messages : pave_reports, sonet_ds3_reports, sonet_ds3_detail, sonet_sts1_reports, sonet_sts1_detail, sonet_oc12_reports, sonet_oc12_detail, sonet_oc48_reports, and sonet_oc48_detail.

Example embodiments of the nine (9) SONET message formats discussed herein are further described in Table 2, below. Table 2 can be found in section 6 of the present specification and is self-explanatory. The embodiments of the network performance messages of the present invention comprise complete record formats. It would be apparent to one skilled in the relevant art to develop alternative embodiments for network performance messages comprising a different number of fields and different field definitions.

The Real Time Topology (RTT) system 206 receives daily updates from the topology database. The topology messages provide information on the various devices that comprise the network and on the configuration of those devices. The RTT 206 receives the topology information and sends it to the open

database 208 weekly. There are sixteen (16) different types of topology messages : ATT_EQUIP, CUSTOMER, CUSTOMER_CIRC, DS3_ROUTE, DXC31, DXC31_ALT, EQUIP_TYPES, FIBER_XREF, MUX, RADIO_DREI, RADIO_ROUTE, SEGMENT, STATION, STATION_NACS, SYS_ROUTE, and TRUNK.

Example embodiments of the sixteen (16) topology message formats discussed herein are further described in Table 3, below. Table 3 can be found in section 6 of the present specification and is self-explanatory. The embodiments of the network performance messages of the present invention comprise complete record formats. It would be apparent to one skilled in the relevant art to develop alternative embodiments for network performance messages comprising a different number of fields and different field definitions.

The ODB Clients 210 send a user query to the open database 208 requesting for specific network performance and topology information. Because the open database is implemented using a standard, relational database format, the ODB Clients 210 can access the performance and topology information using the structured query language (SQL). More specifically, the open database can be accessed and displayed using any commercial off-the-shelf software, such as Microsoft Excel, that implements SQL. Upon receiving a user query, the open database 208 returns to the ODB clients 210 the selected performance and topology data that matches the user query.

FIG. 3 is a level 1 data flow diagram illustrating the components of the open database 210 and their relationship to the external interfaces (as shown in FIG. 2) and to each other. The components of the open database 210 include : the network performance data parser 302, network performance data loader 314, topology data loader 316, sonet data loader 318, and ODB DBMS 322.

Referring again to FIG. 2, the LSE 202 sends network performance data to the open database 208. More specifically, as shown in FIG. 3, the network performance data parser 302 establishes a TCP/IP connection with the external data source LSE 202 and acts as a server to the LSE 202. The network performance data parser 302 receives network performance messages from the

LSE 202 in real time, parses the messages, and generates reformatted performance messages according to the parsing rules 304. The reformatted performance messages are stored as data records in the performance data file 308, whereas information about the performance data file 308, such as filename and file size is stored in the tracking file 306.

Example embodiments of the parsing rules discussed herein are further described in Table 4, below. Table 4 can be found in section 6 of the present specification and is self-explanatory. The embodiments of the parsing rules of the present invention comprise complete record formats. It would be apparent to one skilled in the relevant art to develop alternative embodiments for the parsing rules comprising a different number of fields and different field definitions.

The network performance data parser 302 receives the network performance messages and parses them according to the parsing rules 304. The parsed messages are stored in the performance data file. There are nineteen (19) different types of parsed messages. The ESFMU messages include : monitor_cntl, odb_sites, odb_equip_codes, esfmu_reports, esfmu_detail, esfmu_exceptions, and esfmu_cert_summary. The BBDXC messages include : bbdxc_reports, bbdxc_detail, and bbdxc_exceptions. The DS3MU messages include : ds3mu_reports, ds3mu_detail, and ds3mu_exceptions. The EIMU messages include : elmu_reports, elmu_detail, and elmu_exceptions. The OSCU messages include : ocsu_reports, oscu_detail, and oscu_exceptions.

Example embodiments of the nineteen (19) parsed message formats discussed herein are further described in Table 5. Table 5 can be found in section 6 of the present specification and is self-explanatory. The embodiments of the parsed messages of the present invention comprise complete record formats. It would be apparent to one skilled in the relevant art to develop alternative embodiments for parsed messages comprising a different number of fields and different field definitions.

The network performance data loader 314 reads the parsed messages from the performance data file 308 as they become available, according to the file information stored in the tracking file 306, and loads the parsed messages into the

ODB database management system (DBMS) 322. The network performance data loader 314 also uses a placeholder file 320 to store information on the current position in the tracking file 306 and performance data file 308 from which it is reading. The two-headed arrow between the network performance data loader 314 and the placeholder file 320 indicates that the network performance data loader 314 reads and writes data to the placeholder file 320.

Referring again to FIG. 2, the RTT 206 sends topology data to the open database 208. More specifically, as shown in FIG. 3, the RTT 206 writes the data directly into a topology data file 310. The topology data loader 316 reads the topology data from the topology data file 310 on a weekly basis and loads it directly into the ODB DBMS 322. Because the RTT 206 writes the topology data to the topology data file 310 in a format compatible with the ODB DBMS 322, the topology data loader 316 does not have to parse or reformat the data.

Referring again to FIG. 2, the PAVE 204 sends LTE & TBM sonet data to the open database 208. More specifically, as shown in FIG. 3, the PAVE 204 writes the data directly into a sonet data file 312. The sonet data loader 318 reads the sonet data from the sonet data file 312 on a daily basis and loads it directly into the ODB DBMS 322. Because the PAVE 204 writes the sonet data to the sonet data file 310 in a format compatible with the ODB DBMS 322, the sonet data loader 318 does not have to parse or reformat the data.

Referring again to FIG. 2, the ODB clients 210 send a user query to the open database 208. More specifically, as shown in FIG. 3, the ODB DBMS 322 receives the user query. The ODB DBMS 322 is a commercially available relational database that supports the SQL interfaces as well as specialized processing. The specialized processing includes : nightly database maintenance, user views, stored client queries, etc. Upon receiving a user query, the ODB DBMS 322 accesses its data tables containing the network performance and topology data to prepare a response. The ODB DBMS 322 returns to the ODB clients 210 the selected performance and topology data.

3. *Control Flow of the Network Performance Data Parser*

FIG. 4 is a control flow diagram representing the operation of the network performance data parser 302. The network performance data parser 302 begins executing at step 402 and immediately goes to step 404. In step 404, the network performance data parser 302 reads the parsing rules 304 from the parsing rules file. Continuing to step 406, the network performance data parser 302 determines whether the parsing rules file exists. If the parsing rules file does not exist, then the network performance data parser 302 proceeds to step 408 and exits.

Referring again to step 406, if it is determined that the parsing rules file exists, the network performance data parser 302 proceeds to step 410. In step 410, the network performance data parser 302 creates a pattern mapping, according to the parsing rules 304, for each of the network performance data messages that it will receive. Continuing to step 412, the network performance data parser 302 enters an infinite loop. The network performance data parser 302 loops forever waiting for the receipt of a network performance message.

In step 412, the network performance data parser 302 waits for an incoming network performance message. Once it receives a performance message, the network performance data parser 302 proceeds to step 414. In step 414, the network performance data parser 302 determines whether the received performance message is event data. Event data is a network performance message that is detailed in the parsing rules 304. If the received performance message is not event data, the network performance data parser 302 returns to step 412 and waits for the next network performance message to arrive.

Referring again to step 414, if the received performance message is event data, the network performance data parser 302 proceeds to step 416. In step 416, the network performance data parser 302 processes the received performance message. Step 416 is described in greater detail below. After processing the message, the network performance data parser 302 continues to step 418. In step 418, the network performance data parser 302 processes the reload-parsing-rules signal. The reload-parsing-rules signal indicates whether a new parsing rules file

is available for loading into the parsing rules 304. Step 418 is described in greater detail below. Continuing from step 418, the network performance data parser 302 returns to step 412 and waits for the next network performance message to arrive.

FIG. 5 is a control flow diagram of step 416 regarding the processing of a performance message. The network performance data parser 302 begins executing at step 502 and immediately goes to step 504. In step 504, the network performance data parser 302 matches the received performance message against the parsing rules 304. Continuing to step 506, the network performance data parser 302 determines whether a parsing rule has been found that matches the performance message. If a matching parsing rule has not been found, the network performance data parser 302 proceeds to step 508 and writes the received performance message to an error log. The network performance data parser 302 continues to step 516 and returns processing back to step 416 in FIG. 4.

Referring again to step 506, if the network performance data parser 302 determines that a matching parsing rule has been found, it proceeds to step 510. In step 510, the network performance data parser 302 parses the received performance message according to the matching parsing rule. Continuing to step 512, the network performance data parser 302 reformats the performance message into an ODB DBMS 322 reformatted message format. The network performance data parser 302 invokes one or more user functions to perform the reformatting of the performance data message.

After completing step 512, the network performance data parser 302 continues to step 514 where it writes the reformatted performance message to the performance data file 308. Step 514 is described in greater detail below. From step 514, the network performance data parser 302 continues to step 516 where it returns processing back to step 416 in FIG. 4.

FIG. 6 is a control flow diagram of step 514 regarding the writing of a reformatted performance message to the performance data file 308. The network performance data parser 302 begins executing at step 602 and immediately goes to step 604. In step 604, the network performance data parser 302 finds the

newest tracking file. The newest tracking file is the tracking file 306 with the most recent time/date stamp. Continuing to step 606, the network performance data parser 302 determines whether the tracking file 306 exists. If the tracking file 306 does not exist, the network performance data parser 302 proceeds to step 608. In step 608, the network performance data parser 302 creates a tracking file 306 before continuing to step 610. Referring again to step 606, if the network performance data parser 302 determines that the tracking file 306 does exist, it proceeds directly to step 610.

In step 610, the network performance data parser 302 finds the newest performance data file. The newest performance data file is the performance file 308 with the most recent time/date stamp. Continuing to step 612, the network performance data parser 302 determines whether the performance data file 308 exists. If the performance data file 308 does not exist, the network performance data parser 302 proceeds to step 614. In step 614, the network performance data parser 302 creates a performance data file 308 before continuing to step 616. Referring again to step 612, if the network performance data parser 302 determines that the performance data file 308 does exist, it proceeds directly to step 616.

In step 616, the network performance data parser 302 creates an entry in the tracking file 304 for referencing the selected performance data file 308. Continuing to step 618, the network performance data parser 302 adds the reformatted performance message data record to the performance data file 308. Step 618 is described in greater detail below. After step 618, the network performance data parser 302 continues to step 620 and returns processing to step 514 in FIG. 5.

FIG. 7 is a control flow diagram of step 618 regarding the adding of a reformatted performance message data record to the performance data file 308. The network performance data parser 302 begins executing at step 702 and immediately goes to step 704. In step 704, the network performance data parser 302 writes the reformatted data record to the performance data file 308. Continuing to step 706, the network performance data parser 302 determines

whether the performance data file 308 is full. If the performance data file 308 is not full, the network performance data parser 302 proceeds to step 712. Step 712 is described in greater detail below.

Referring again to step 706, if the network performance data parser 302 determines that the performance data file 308 is full, it proceeds to step 708. In step 708, the network performance data parser 302 closes the performance data file 308. Continuing to step 710, the network performance data parser 302 creates a new performance data file 308 and then goes to step 712.

In step 712, the network performance data parser 302 updates the performance data file entry in the tracking file 304 to account for the new data record. Continuing to step 714, the network performance data parser 302 creates a new entry in the tracking file 304. After step 714, the network performance data parser 302 continues to step 716 and returns processing to step 618 in FIG. 6.

FIG. 8 is a control flow diagram of step 418 regarding the processing the reload-parsing-rules signal. The network performance data parser 302 begins executing at step 802 and immediately goes to step 804. In step 804, the network performance data parser determines whether a reload-parsing-rules signal exists. If the reload-parsing-rules signal does not exist, the network performance data parser 302 proceeds to step 806 and returns processing to step 418 in FIG. 4.

Referring again to step 804, if the network performance data parser 302 determines that the reload-parsing-rules signal exists, it proceeds to step 808. In step 808, the network performance data parser 302 reads the parsing rules from the new parsing rules file. Continuing to step 810, the network performance data parser 302 creates the pattern mapping according to the new parsing rules. The network performance data parser 302 continues to step 812 to determine whether the pattern mapping failed. For example, the pattern mapping may fail due to syntax errors or file errors. If the network performance data parser 302 determines that the pattern mapping did not fail, then it knows that the parsing rules are valid and proceeds to step 806. In step 806, the network performance data parser 302 returns processing to step 418 in FIG. 4.

Referring again to step 812, if the network performance data parser 302 determines that the pattern mapping failed, it knows that the new parsing rules are invalid and proceeds to step 814. In step 814, the network performance data parser 302 reverts to the previous parsing rules 304. Continuing to step 806, the network performance data parser 302 returns processing to step 418 in FIG. 4.

4. Control Flow of the Network Performance Data Loader

FIG. 9 is a control flow diagram representing the operation of a network performance data loader 314. The network performance data loader 314 begins executing at step 902 and immediately goes to step 904. In step 904, the network performance data loader 314 connects to the ODB DBMS 322. Continuing to step 906, the network performance data loader 314 retrieves the list of specific monitoring points that indicates the monitoring points of the telecommunications network from which performance messages will be sent. From step 906, the network performance data loader 314 goes to step 908 at which the network performance data loader 314 enters an infinite loop. The network performance data loader 314 continues to loop while waiting for data records to be written to the performance data file 308.

In step 908, the network performance data loader 314 waits for the network performance data parser 302 to write a data record to the performance data file 308. When the network performance data parser 302 writes a record to the performance data file 308, the network performance data loader 314 retrieves the data record. Step 908 is described in more details below.

Continuing to step 910, the network performance data loader identifies the type of data record that it retrieved from the performance data file 308. Afterwhich, the network performance data loader 314 loads the data record into the corresponding table in the ODB DBMS 322. The network performance data loader 314 returns to step 908 to wait for the network performance data parser 302 to write another data record to the performance data file 308.

FIG. 10 is a control flow diagram representing the operation of step 908 and the process of a network performance data loader 314 waiting and retrieving a data record from the performance data file 308. The network performance data loader 314 begins executing at step 1002 and immediately goes to step 1004. In step 1004, the network performance data loader 314 opens the oldest tracking file. The oldest tracking file is the tracking file 306 having the least recent time/date stamp. Continuing to step 1006, the network performance data loader 314 next opens the placeholder file 320. After step 1006, the network performance data loader 314 continues to step 1008.

In step 1008, the network performance data loader 314 reads the name of the performance data file 320 from which it will retrieve data records and the position in that performance data file 320 at which it will begin retrieving data records. Continuing to step 1010, the network performance data loader 314 goes to the position in the performance data file 320 according to the information it read from the placeholder file 320 in step 1008. Once the network performance data loader 314 is at the correct position, the network performance data loader 314 continues to step 1012 and reads the data record from the performance data file 308 at that position. Step 1012 is described in greater detail below. Continuing to step 1014, the network performance data loader 314 returns processing to step 908 in FIG. 9.

FIG. 11 is a control flow diagram representing the operation of step 1012 and the process of a network performance data loader 314 reading a data record from the performance data file 308. The network performance data loader 314 begins executing at step 1102 and immediately goes to step 1104. In step 1104, the network performance data loader 314 reads the next data record from the performance data file 308 and updates its current position in the placeholder file 320. Continuing from step 1104, the network performance data loader 314 enters step 1106 to determine whether the performance data file 308 returned an end-of-file (EOF).

In step 1106, if the performance data file 308 does not return an EOF, the network performance data loader 314 proceeds to step 1108. In step 1108, the

network performance data loader 314 returns the data record that it had just read from the performance data file 308. Continuing to step 1110, the network performance data loader 314 returns the processing to step 1012 in FIG. 10.

Referring again to step 1106, if the performance data file 308 returns an EOF, the network performance data loader 314 proceeds to step 1112. In step 1112, the network performance data loader 314 retrieves the next performance data file entry in the tracking file 306. Continuing to step 1114, the network performance data loader 314 determines whether the tracking file returned an EOF.

In step 1114, if the tracking file 306 returns an EOF, the network performance data loader 314 proceeds to step 1116. In step 1116, the network performance data loader 314 closes and deletes the current tracking file 308 because it has completed its processing of that tracking file 308. Continuing to step 1118, the network performance data loader 314 finds the oldest tracking file. The oldest tracking file is the tracking file 306 with the least recent time/date stamp. The network performance data loader 314 continues to step 1120 where it determines whether the tracking file 306 exists.

In step 1120, if the tracking file 306 does not exist, the network performance data loader 314 proceeds to step 1110 because there are no more entries in the performance data file 308 to load into the ODB DBMS 322. In step 1110, the network performance data loader 314 returns processing to step 1012 in FIG. 10.

Referring again to step 1120, if the tracking file 306 does exist, the network performance data loader 314 proceeds to step 1122 because there are more entries in the performance data file 308 to process. In step 1122, the network performance data loader 314 processes the next entry in the tracking file 306. Step 1122 is described in greater detail below. Continuing to step 1108, the network performance data loader 314 returns the data record that it had just read from the performance data file 308 before continuing to step 1110. In step 1110, the network performance data loader 314 returns the processing to step 1012 in FIG. 10.

Referring again to step 1114, if the tracking file 306 does not return an EOF, the network performance data loader 314 proceeds to step 1122. In step 1122, the network performance data loader 314 processes the next entry in the tracking file 306. Step 1122 is described in greater detail below. Continuing to step 1108, the network performance data loader 314 returns the data record that it had just read from the performance data file 308 before continuing to step 1110. In step 1110, the network performance data loader 314 returns the processing to step 1012 in FIG. 10.

FIG. 12 is a control flow diagram representing the operation of step 1122 and the processing of a next entry in the tracking file 306. The network performance data loader 314 begins executing at step 1202 and immediately goes to step 1204. In step 1204, the network performance data loader 314 returns the next performance data file entry in the tracking file 306. Continuing to step 1206, the network performance data loader 314 closes and deletes the performance data file 308. The network performance data loader 314 has completed the processing of all of the data records stored in the performance data file 308 which is indicated by the fact that step 1106 determined that the performance data file 308 returned an EOF. Therefore, the performance data file 308 is not needed and is closed and deleted in step 1206.

Continuing to step 1208, the network performance data loader 314 goes to the first position in the performance data file 308 identified in the performance data file entry in the tracking file 306. After step 1208, the network performance data loader continues to step 1210. In step 1210, the network performance data loader reads the next data record from the performance data file 308 and updates its position in the performance data file 308 in the placeholder file 320. Continuing to step 1212, the network performance data loader returns processing to step 1122 in FIG. 11.

5. *Control Flow of the Topology Data Loader*

FIG. 13 is a control flow diagram representing the operation of a topology data loader 316. The topology data loader 316 begins executing at step 1302 and immediately goes to step 1304. In step 1304, the topology data loader 316 connects to the ODB DBMS 322. Continuing to step 1306, the topology data loader 316 enters a loop to retrieve and process all of the topology data records stored in the topology data file 310.

In step 1306, the topology data loader 316 retrieves a data record from the topology data file 310. Continuing to step 1308, the topology data loader 316 determines whether the topology data file 310 returned an EOF. If the topology data file 310 returned an EOF, there are no more data records to process and load into the ODB DBMS 322. Therefore, the topology data loader 316 proceeds to step 1310 and exits.

Referring again to step 1308, if the topology data file 310 does not return an EOF, the topology data loader 316 proceeds to step 1312. In step 1312, the topology data loader 316 identifies the type of topology data record that it had retrieved from the topology data file 310. Continuing to step 1314, the topology data loader 316 loads the topology data record into the ODB DBMS 322. In the preferred embodiment, the topology data loader 316 uses the Sybase utility Bulk-Copy (BCP) to load the topology data record into the ODB DBMS 322. After the topology data record has been loaded, the topology data loader 316 returns to step 1306 to retrieve another data record from the topology data file 310.

6. *Control Flow of the Sonet Data Loader*

FIG. 14 is a control flow diagram representing the operation of a sonet data loader 318. The sonet data loader 318 begins executing at step 1402 and immediately goes to step 1404. In step 1404, the sonet data loader 318 connects to the ODB DBMS 322. Continuing to step 1406, the sonet data loader 318

enters a loop to retrieve and process all of the sonet data records stored in the sonet data file 312.

In step 1406, the sonet data loader 318 retrieves a data record from the sonet data file 312. Continuing to step 1408, the sonet data loader 318 determines whether the sonet data file 312 returned an EOF. If the sonet data file 312 returned an EOF, there are no more data records to process and load into the ODB DBMS 322. Therefore, the sonet data loader 318 proceeds to step 1410 and exits.

Referring again to step 1408, if the sonet data file 312 does not return an EOF, the sonet data loader 318 proceeds to step 1412. In step 1412, the sonet data loader 318 identifies the type of sonet data record that it had retrieved from the sonet data file 312. Continuing to step 1414, the sonet data loader 318 loads the sonet data record into the ODB DBMS 322. In the preferred embodiment, the sonet data loader 318 uses the Sybase utility Bulk-Copy (BCP) to load the sonet data record into the ODB DBMS 322. After the sonet data record has been loaded, the sonet data loader 318 returns to step 1406 to retrieve another data record from the sonet data file 312.

7. Tables.

The following Tables 1-5 are all self-explanitory as described above. As previoulsy stated:

Table 1 comprises example embodiments of the ten (10) network performance message formats as discussed above with reference to FIGs. 2 and 3;

Table 2 comprises example embodiments of the nine (9) SONET message formats as discussed above with reference to FIGs. 2 and 3;

Table 3 comprises example embodiments of the sixteen (16) topology message formats as discussed above with reference to FIGs. 2 and 3;

Table 4 comprises example embodiments of the parsing rules as discussed above with reference to FIGs. 2 and 3; and

Table 5 comprises example embodiments of the nineteen (19) parsed message formats as discussed above with reference to FIGs. 2 and 3.

Generation 2 Performance Poll Message - ESFMU message

Format:

sequence_number^julian_day^device_identifier:^EE^mm/dd/yy^hh:mm:ss^shelf,card^direction type^res^les^rses^oof^fss^csu^ss^csu_est_err^csu_synch_es^csu_synch_fs^COMPL

Example:

888^293^CHUCN0: EE 10/20/95 00:45:00 17,28 E000000 000 900 000 900 000 900 COMPL

Note that in this example, there is no CSU data reported.

Explanation:

sequence_number	Sequence number, up to 7 digits. Reset at midnight.
julian_day	Julian date (day of the year), range of 1-366
device_identifier	Device Identifier. Contains: 3 character site id 3 character equipment identifier
EE	Indicates that this is a GEN 2 ESFMU performance message
mm/dd/yy	Date at the beginning of the reporting period.
hh:mm:ss	Time at the beginning of the reporting period.
shelf	Shelf identifier, numeric range of 01 through 18
card	Card identifier, numeric range of 01 through 28
direction	Direction (E=Network side, W=Customer Side of monitoring unit)
type	Type of data. 6 positions Position 1: 0=Non CSU data only 1=CSU data included 4 additional fields included ?=unrecognizable data included
res	Raw Errored Seconds
les	Link errored Seconds
rses	Raw Severely errored seconds
lses	Link severely errored seconds
oof	Out of Frame
fss	Failed Signal State
csu_ss	CSU current status byte. Values: UF00 00L0 The U bit is 1 if the F or L bit is 1 The F bit is 1 if unit in failed signal state The L bit is 1 if the unit is in DTE loopback state

TABLE 1

csu_esf-err	CSU ESF errors, numeric range of 0-65535
csu_synch_es	CSU synchronous errored seconds, numeric range of 0-900.
csu_synch_fs	CSU synchronous failed seconds, numeric range of 0-900.
COMPL	Indicates the end of the message.

Generation 2 Performance Poll Message - CSU message

Format:

sequence_number^julian_day^device_identifier:^EC^mm/dd/yy^hh:mm:ss^shelf,card^ csu_ss^csu_esf_err^csu_synch_es^csu_synch_fs^COMPL

Example:

889^293^CHUCN0: EC 10/20/95 00:45:00 17,28 82 123 456 789 COMPL

Explanation:

sequence_number	Sequence number, up to 7 digits. Reset at midnight.
julian_day	Julian date (day of the year), range of 1-366
device_identifier	Devise Identifier. Contains: 3 character site id 3 character equipment identifier
EC	Indicates that this is a GEN 2 CSU performance message
mm/dd/yy	Date at the beginning of the reporting period.
hh:mm:ss	Time at the beginning of the reporting period.
shelf	Shelf identifier, numeric range of 01 through 18
card	Card identifier, numeric range of 01 through 28
csu_ss	CSU current status byte. Values: UF00 00L0 The U bit is 1 if the F or L bit is 1 The F bit is 1 if unit is in failed signal state The 1 bit is 1 if the unit is in DTE loopback state
csu_esf_err	CSU ESF errors, numeric range of 0-65535
csu_synch_es	CSU synchronous errored seconds, numeric range of 0-900.
csu_synch_fs	CSU synchronous failed seconds, numeric range of 0-900.
COMPL	Indicates the end of the message.

Generation 2 Performance Poll Message (Crunched)

Format:

sequence_number^julian_day^device_identifier:^Edirection^mm/dd/yy^hh:mm:ss^shelf,card^

TABLE 1 (continued)

type^register_values,res,les,rses,lses,oof,fss,csu_ss,csu_est_err_err,csu_synch_es,
csu_synch_fs^COMPL

Examples:

1. 890 293 CHUCN0: EW 10/20/95 00:45:00 17,26 0 300053,900,900,900,900,,900 COMPL
2. 891 293 CHUCN0: EW 10/20/95 00:45:00 17,27 1 900,900,900,900,,900,12,34,56,78 COMPL
3. 892 293 CHUCN0: EW 10/20/95 00:45:00 17,28 ? 1,1,1 COMPL

4. 892 293 CHUCN0: EW 10/20/95 00:45:00 17,28 ? ,,,,,,? COMPL

Note that fields between two commas are assumed to be nominal. Fields absent at the end of the messages and before the "COMPL" are also nominal.

Explanation:

sequence_number	Sequence number, up to 7 digits. Reset at midnight.
julian_day	Julian date (day of the year), range of 1-366
device_identifier	Device Identifier. Contains: 3 character site id 3 character equipment identifier
E	Indicates that this is a GEN 2 ESFMU performance crunch message
direction	Direction (E=Network side, W=Customer Side or monitoring unit)
mm/dd/yy	Date at the beginning of the reporting period.
hh:mm:ss	Time at the beginning of the reporting period.
shelf	Shelf identifier, numeric range of 01 through 18
card	Card identifier, numeric range of 01 through 28
type	Type of crunch message. 0 - Indicates only ESFMU data is reported. 7 fields of data only. 1 - CSU data is included, 4 additional fields are available to report CSU data. If no data is present in the message then the data is inferred as nulls. ESFMU data is present. Generate the CSU report. ? - CSU data is encountered but is unrecognizable. ESFMU data is present. Generate the SCU report.

TABLE 1 (continued)

register_values	Register values, type 0 record only.
res	Raw Errored Seconds
les	Link errored Seconds
rses	Raw Severely errored seconds
lses	Link severely errored seconds
oof	Out of Frame
fss	Failed Signal State
csu_ss	CSU current status byte. Values: UF00 00L0 The U bit is 1 if the F for L bit is 1 The F bit is 1 if unit is in failed signal state The L bit is 1 if the unit is in DTE loopback state
csu_esf_err	CSU ESF errors, numeric range of 0-65535
csu_synch_es	CSU synchronous errored seconds, numeric range of 0-900.
csu_synch-fs	CSU synchronous failed seconds, numeric range of 0-900.
COMPL	Indicates the end of the message.

Generation 2 Performance Nominal Message

Format:

sequence_number^julian_day^device_identifier:^PN^mm/dd/yy^hh:mm:ss^shelf^
ExxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxWxxxxxxxxxxxxxxxxxxxxxxxxxxxx^COMPL

Example:

871 293 ASTCN0: PN 10/20/95 00:45:00 01 E.2...-...?..--.-2?-2.....W.2...-...?..--.-2?-2.....
COMPL

Explanation:

sequence_number	Sequence number, up to 7 digits. Reset at midnight.
julian_day	Julian date (day of the year), range of 1-366
device_identifier	Device Identifier. Contains: 3 character site id 3 character equipment identifier

TABLE 1 (continued)

EC	Indicates that this is a GEN 2 CSU performance message
mm/dd/yy	Date at the beginning of the reporting period.
hh:mm:ss	Time at the beginning of the reporting period.
shelf	Shelf identifier, numeric range of 01 through 18
E	Direction - East side of the card reporting.
W	Direction - West side of the card reporting.
x	Each x represents a card number reporting data. There are 28 positions per direction. Values: '.' - standard reporting has occurred. A separate ESFMU report should have been generated. '2' - Gen 2 card reporting nominal data but no CSU data was included. 'C' - Gen 2 card reporting nominal data including CSU data also reporting nominal. '?' - Gen 2 card reporting nominal data but CSU data was not available. '-' - Card is off line. No data is reported for this period. 'E' - Gen 3 ESFMU nominal 'D' - Gen 3 D4 format nominal.
COMPL	Indicates the end of the message.

Generation 3 Performance Poll Message (type 1 ESF circuit)

Format:

sequence_number^julian_day^device_identifier:^15^mm/dd/yy^hh:mm:ss^shelf,card^
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,
20,21,22,23,24,25,26,27,28^COMPL

Example:

888 293 ASTCN0: 15 10/20/95 00:45:00 01,01 E1 1,2,3,,,6,7,8,9,10,
11,12,13,14,15,16,17,18,19

889 293 ASTCN0: 15 10/20/95 00:45:00 01,01 E1 -20 20,,22,23,24,25 COMPL

Explanation:

These messages can be broken into multiple lines. A continuation condition is indicated when a line ends with a "," and not the "COMPL" code. COntinuation lines will repeat the fixed information followed by a "-" character to indicate "Continuation". Any data field containing zeros (0) will be supressed and not reported. The message wraps based on the length of the message and is completely dependent on the data reported by the cards.

TABLE 1 (continued)

sequence_number	Sequence number, up to 7 digits. Reset at midnight.
julian_day	Julian date (day of the year), range of 1-366
device_identifier	Device Identifier. Contians: 3 character site id 3 character equipment identifier
15	Indicates that this is a GEN 3 ESFMU performance message
direction	Direction (E=Network side, W=Customer Side of monitoring unit)
mm/dd/yy	Date at the beginning of the reporting period.
hh:mm:ss	Time at the beginning of the reporting period.
shelf	Shelf identifier, numeric range of 01 through 18
card	Card identifier, numeric range of 01 through 28
performance indicators	Each performance indicator, separated by a comma ",":

1-	seconds in interval	
2-	MMS	Maintenance Mode Seconds
3-	NISS	Not-in-service seconds
4-	ES-L	Errored seconds
5-	SES-L	Severely Errored Seconds
6-	LOSS-L	Loss of signal seconds
7-	CV-L	Code Violation
8-	SAS-P	SEF/AIS seconds
9-	AISS-P	Alarm Indication Signal Seconds
10-	CSS-P	Controlled Slip Seconds
11-	ES-P	Errored Seconds
12-	SES-P	Severely Error Seconds
13-	UAS-P	Unavailable Seconds
14-	CV-P	Code Violations
15-	CV-PFE	Code Violations
16-	ES-PFE	Errored Seconds
17-	ESA-P	Errored Seconds
18-	ESA-PFE	Errored Seconds
19-	ESB-P	Errored Seconds
20-	ESB-PFE	Errored Seconds
21-	SES-PFE	Severely Errored Seconds
22-	SEFS-PFE	Severely Errored Frame Seconds
23-	CSS-PFE	Controlled Slip Seconds
24-	UAS-PFE	Unavailable Seconds
25-	ES-LFE	Errored Seconds
26-	FEC-L	Failure Count
27-	FEC-P	Failure Count
28-	FEC-PFE	Failure Count

GEN3 performance messages take on a different look, due to the enhanced data collection capabilities of the GEN3 card. All data, including far-end CSU data is included in a single message. By default, all GEN3 performance messages are output in a zero-suppressed format.

TABLE 1 (continued)

Alcatel 1633 Broadband DXC

The Alcatel 1633 TL1 DXC reports the following information:

Format:

st1:P mm/dd/yy hh:mm:ss ppp berl perp evl evp fpe oofp esl esp sesl sesp uasp psc psd pes fes aiss cpe loss COMPL

Explanation:

ppp	DXC port number
berl	Bit error Ratio Line count
perp	Bit Error Ratio Path count
cvl	Accumulated Coding Violation Line count
cvp	Accumulated Coding Violation Path count
fpe	Frame paity Error
oofp	Out of Frame path error
esl	Error Second Line count
esp	Error Second Path count
sesl	Severely Errored Seconds line count
sesp	Severely Errored Seconds path count
uasp	Unavailable Errored seconds Path
psc	Protection Switch counts
psd	Protection Switch Duration
pes	Parity Error Second Count
fes	Frame Error Second count
aiss	AIS Second count
cpe	C-bit parity error count
loss	Line Loss of signal Seconds

The equipment type (e.g. ST1) is converted to the equipment alpha indicator. ST1 is converted to "AA", ST2 is converted to "AB" and so on.

DS3MU

Format of Standard Message:

site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx INF sii nis pb cb cf in
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx LIN es loss
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx PAR cv es esa esb ses COMPL*
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx PAR - %efs bber uas %avl sef ais COMPL*
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx CBT cv es esa esb ses
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx CBT - %efs bber uas %avl
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx FEP cv es esa esb ses

TABLE 1 (continued)

site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx FEP - %efs bber uas %avl sef ais
site_idM3A: D mm/dd/yy hh:mm:ss ds3,mp xx All data is nominal COMPL

*
The COMPL flag is optional.

site_id
3 character site identifier

M3A:
Identifies this message as a DS3MU site controller message.

D
Type of message is 15 minute performance data, or is 24 hour performance data.

mm/dd/yy
Date that the message was generated, date at the beginning of the 15 minute interval.

hh:mm:ss
Time that the message was generated, time at the beginning of the 15 minute interval.

ds3
DS3MU shelf identifier.

mp
Monitor point number. There are 6 mp's per card, 90 mp's per shelf.

xx
Interval. '15' indicates 15 minute interval.

INF
General information.

LIN
Line level information.

PAR
Near-end parity information (M23).

CBT
C-bit parity information

FEP
Far-end (FEBE/FEAC) information.

DAT

TABLE 1 (continued)

TBD.

Near-End M23 application fields (cb="M23") :

xx	Command Exec	
sii	Seconds in Interval	0-900 for 15 min / 0-86400 for 24 hr
nis	Not in service seconds	0-900 for 15 min / 0-86400 for 24 hr
pb	Monitoring Mode	PB=Parity bit/FB-Frame Bit
cb	C-bit indicator	CBT for c-bit/M23 for m23
cf	Change of format	FC=form.change/NC= no change
in	Incomplete Period Indicator	PI for incom/OK for complete
es	(ES-LINE) Errored Seconds	0-900 for 15 min / 0-86400-for 24 hr
loss	(loss-line) Loss of Signal Seconds	0-900 for 15 min / 0-86400 for 24 hr
cv	(CV-PATH) Code Violation	0-65535 for 15 min / 0-4194303 for 24 hr
es	(ES-PATH) Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
esa	(ESA-PATH) Errored Seconds Type A	0-900 for 15 min / 0-86400 for 24 hr
esb	(ESB-PATH) Errored Seconds Type B	0-900 for 15 min / 0-86400 for 24 hr
ses	(SES-PATH) Severely Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
%efs	(%EFS-PATH) Present Err. Free Second	000.00% to 100.0%
bber	(BBER-PATH) Background Bit Error Rate	00-99 for mm/ -06 to -11 ee 15min/ -06 to -13 ee 24 hr
uas	(UAS-PATH) Unavailable Seconds	0-900 for 15 min / 0-86400 for 24 hr
%avL	(%AVL-PATH) Percent Err. Availability	000.00% to 100.0%
sef	(SEFS-PATH) Severely Err. Frame Seconds	0-900 for 15 min / 0-86400 for 14 hr
ais	(AISS-PATH) Alarm Indicat Signal Secs	0-900 for 15 min / 0-86400 for 24 hr

Near-end C-bit application fields (cb="CBT") :

cv	(CV-PATH) Code Violation	0-65535 for 15 min/ 0-4194303 for 24 hr
es	(ES-PATH) Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
esa	(ESA-PATH) Errored Seconds Type A	0-900 for 15 min / 0-86400 for 24 hr
esb	(ESB-PATH) Errored Seconds Type B	0-900 for 15 min / 0-86400 for 24 hr
ses	(SES-PATH) Severely Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
%efs	(%EFS-PATH) Percent Err. Free Second	000.00% to 100.0%
bber	(BBER-PATH) Background Bit Error Rate	00-99 for mm/ -06 to -11 ee 15 min/ -06 to -13 ee 24 hr
eas	(UAS-PATH) Unavailable Seconds	0-900 for 15 min / 0-86400 for 24 hr
%avL	(%AVL-PATH) Percent Err. Availability	000.00% to 100.0%

TABLE 1 (continued)

Far-end C-bit application fields (cb="CBT" and "FEP" line)

cv	(CV-PATH) Code Violation	0-65535 for 15 min / 0-4194303 for 24 hr
es	(ES-PATH) Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
esa	(ESA-PATH) Errored Seconds Type A	0-900 for 15 min / 0-86400 for 24 hr
esb	(ESB-PATH) Errored Seconds Type B	0-900 for 15 min / 0-86400 for 24 hr
ses	(SES-PATH) Severely Errored Seconds	0-900 for 15 min / 0-86400 for 24 hr
%efs	(%EFS-PATH) Percent Err. Free Second	000.00% to 100.0%
bber	(BBER-PATH) Background Bit Error Rate	00-99 for min / -06 to -11 ee 15 min/-06 to -13 ee 24 hr
uas	(UAS-PATH) Unavailable Seconds	0-900 for 15 min / 0-86400 for 24 hr
%avL	(%AVL-PATH) Percent Err. Availability	000.00% to 100.0%
sef	(SEFS-PATH) Severely Err. Frame Seconds	0-900 for 15 min / 0-86400 for 24 hr
ais	(AISS-PATH) Alarm Indicat Signal Secs	0-900 for 15 min / 0-86400 for 24 hr

E1MU

1. Performance Poll Message

Format (each performance indicator is zero-suppressed):

E1M: P hh:mm:ss nnn,c,mp
aiss,bberp,berp,besl,besp,besr,code,crc,esl,esp,esr,ess,fas,lofs,loss,prbs,rais,rebe,sesl,sesp, sesr,sess,usal,uasp,uasr,uass COMPL

Explanation:

TABLE 1 (continued)

hh:mm:ss	time at the beginning of the monitoring period
nnn	shelf name
c	card number (1-15)
mp	monitoring poing number (1-16)
aiss	Alarm Indication Signal Seconds count
bberp	Background Block Error Ratio Path
berp	Bit Error Ratio Path count
besl	Burst Errored Seconds Line count
besp	Burst Errored Seconds Path count
besr	Burst Errored Seconds Remote count
code	Code Error count
crc	Cyclic Redundancy Checksum error count
esl	Errored Seconds Line count
esp	Errored Seconds Path count
esr	Errored Seconds Remote count
ess	Errored Seconds Service count
fas	Frame Alignment Signal error count
lofs	Loss of Frame Seconds count
loss	Line Loss Of Signal Seconds
prbs	Pseudo Random Bit Sequence error count
rais	Remote Alarm Indication Seconds
rebe	Remote End Block Error count
sesl	Severely Errored Seconds Line count
sesp	Severely Errored Seconds Path count
sesr	Severely Errored Seconds Remote count
sess	Severely Errored Seconds Service count
uasl	Unavailable Seconds Line count
uasp	Unavailable Seconds Path count
uasr	Unavailable Seconds Remote count
uass	Unavailable Seconds Service count

2. Performance Nominal Message

The performance nominal or PN messages are sent on a card-by-card basis as a list of monitoring points.

Format:

EIM: PN mm:dd:yy:hh:mm:ss nnn,c,mp-mp,mp,mp,mp,mp,mp COMPL

Explanation:

hh:mm:ss	time at the beginning of the monitoring period
nnn	shelf name
c	card number (1-15)

TABLE 1 (continued)

mp monitoring poing number (1-16)

Example:

Here is an example of a PN message where monitoring points 1 through 4, 7, 9 through 12, and 14 have reported zero data:

EIM: PN hh:mm:ss nnn,c 1-4,7,9-12,14 COMPL

OCSU/VC12

The Site Controller reports for the OCSU are similar to the Alcatel 1633SX and EIMU reports. Report line length is limited to the existing Site Controller internal message length of 128 bytes. The Performance Incomplete ("PI") and Performance Nominal ("PN") messages uses ranging where ever possible to reduce total message size. The Performance ("P") message will be issued for each port reporting valid non zero data in at least one field. The "P" messages will use zero suppression to reduce the total message size. This means that zeros will not be included in the data and parameters will be included up to the last non-zero parameter.

OC3 performance data from the OCSU includes individual validity flags for each parameter. If an OC3 "P" message is generated, any parameter flagged as invalid will be respresented as "?".

Port numbering scheme used for these reports:

VC-12 ports	
Ports 1-63	Facility side VC12s 1-63
Ports 64-126	Terminal side VC-12s 1-63

OC3 ports	
Port 1	Facility side OC3
Port 2	Terminal side OC3

The 4 character data type field used for these reports:

3C12	Imbedded VC-12 data
OC3^	OC3 data

Where ^ represents a space.

"P" Message description:

OSU: P HH:MM:SS 3C12 aaa,p ES-V,SES-V,UAS-V,EB-V,ES-VFE,UAS-VFE,EB-VFE COMPL

OSU: PN HH:MM:SS tttt aaa pl,p2-p3 COML

TABLE 1 (continued)

OSUL PI HH:MM:SS tttt aaa pl,p2-p3 COMPL

Where

HH:MM:SS	is the report start time
tttt	is the report MUX level
aaa	is the shelf name
p	is the port number
pl	is a single port
p2	is a port range starting port number
p3	is a port range ending port number
ES-V	is errored seconds
SES-V	is severely errored seconds
UAS-V	is unavailable seconds
EB-V	is errored blocks
ES-VFE	is errored seconds far end
SES-VFE	is severely errored seconds far end
UAS-VFE	is unavailable seconds far end
EB-VFE	is errored blocks far end
ESS	is section errored seconds
SESS	is section severely errored seconds
SEFS	is severely errored framing seconds
CVS	is section coding violations
CVP	is path coding violations

Example report:

OSU: P 02:15:00 3C12 FOO,1 „,45 COMPL

VC-12 facility side ports 2 through 7 are nominal

OSU: PN 02:15:00 3C12 FOO 2-7 COMPL

VC-12 facility side ports 8 through 63 and terminal side ports 1 through 63 are incomplete.

OSU: P1 02:15:00 3C12 FOO 8-126 COMPL

OC3 facility and terminal sides are nominal

OSU: PN 02:15:00 OC3 FOO 1-2 COMPL

SONET LTE and TBM

1. From the PAVE System

The following describes the SONET device performance information obtained via the PAVE system.

The file will be ASCII comma-delimited, with character fields quoted. Here is the file format:

TABLE 1 (continued)

Field	Field Name	Type	Width	Description
1	ODB_MUX	Character	3	Mux (3 Character Site code)
2	ODB_ALPHA	Character	6	Alpha System designator
3	ODB_NETYPE	Character	4	Device type (LTE or TBM)
4	ODB_LEVEL	Character	6	Service level (OC48, OC12 or DS3)
5	ODB_LINE	Character	3	NE line
6	ODB_DIR	Character	1	Direction (T or R)
7	ODB_DATE	Character	8	Date as YYYMMDD
8	ODB_SPAN	Character	1	L (line), P (Path) or S (Sect)
9	ODB_PERCOL	Numeric	6	# periods collected (1 if collected OK)
10	ODB_PERMIS	Numeric	6	# periods missed (1 if not collected)
11	ODB_PERERR	Numeric	6	# error period (1 if errors in record)
12	ODB_ES	Numeric	6	ES count
13	ODB_SES	Numeric	6	SES count
14	ODB_SEFS	Numeric	6	SEFS count
15	ODB_UAS	Numeric	6	UAS count
16	ODB_AISS	Numeric	6	AISS count

2. SONET PM data via the LSE

The follwing information was obtained from Northern Telecom, S/DMS TransportNode OC-3/OC-12 NE-TBM, TL1 interface Description, Release 7 Standard (NT7E65DC 323-1111-190) March 1994.

The Report PM messages are reported every hour per NE. The message is used to automatically report the PM statistics from the NEs to the OS. ALthough the interval between REPT PM messages from a NE is guaranteed to be one hour, the actual time which the REPT PM message is issued depends on both the time which the TL1 connection was established and on the number of network elements in the system.

If the system contains N network elements, then the OS will not receive N REPT PM messages on the hour. Instead, the OS will receive N REPT PM messages spread out over the hour with an interval of 60/N minutes.

The network elements also report the hourly PM counts to the OPC spread out over the hour to prevent overloading the communications channel with PM data. Because of the two stage PM reporting, NE to OPC and OPC to TL1 interface, the REPT PM message will always report the PM counts for the hourly period two hours behind the actual hour to guarantee the PM counts are accurate. For example, the REPT PM message received at 12:15 will report the PM counts for the 10:00 period.

Only non-zero values are reported.

Format:

TABLE 1 (continued)

sequence_number^julian_day^REpT^PM^host_office^^^^<source identifier>^<date>^<time>crlf
A^^a^REPT^PM^b crlf
^^^^"c:d,e,f,g,h,i,j,k"crlf
;

Where:

source identifier	NE name or OPC that originated the TL1 message
date	TL1 message origination date
time	TL1 message origination time
a	ATAG (automatic message tag)
b	SCCM (second command code modifier)
c	AID (access identifier)
d	MONTYPE (type of monitored parameter)
e	MONVAL (value of monitored parameter)
f	VLDTY (validity indicator) COMPL indicates complete
g	LOCN (alarm location) NEN=Near End
h	DIRN (alarm direction) AZ=transmit, ZA=receive
i	TMPER (accumulation time period) 1-HR=1 hour
j	MONDAT (date of beginning of PM period) MM-DD-YY format
k	MONTM (time of beginning of PM period) HH-MM format

Example:

12345319^REPT PM^OPC004MBLJ^^^^^O0425^95-11-15^01:41:03
A^^34885 REPT PM T4X8
^^^^"1-12G1:LBCL,99,PRTL,NEND,AZ,1-HR,11-14,23-00"
^^^^"1-12G2:LBCL,101,PRTL,NEND,AZ,1-HR,11-14,23-00"

a. The Access Identifier (AID)

This parameter contains the identification of the administrative view.

SCCM	AID Value	Example
OC48,T9X	<Eq_id>-<CP_name>-C<first chan no.>[-C<last chan no.>]	1-A
OC12,T4X8	<Eq_id>-<CP_name>	1-12G1
T3	<Eq_id>-<CP_name>-<Port_id>	1-3G1-3

Where:

TABLE 1 (continued)

Eq_id integer value from 1 to N (normally equals 1). N represents the variable nature of the upper limit of the parameter value.

CP_name 3G1 to 3G16, or 3P for a DS3 Mapper circuit pack
12G1 to 12G8 for OC-12 interface circuit packs
SG1 for STS-1 tributaries
S3G1 for STS-1 path termination
A, B for terminals and ADMs; AE, BW, AW, BE for regenerators on an OC-48 circuit pack
ESIG1 or ESIG2 for an external synchronization interface circuit pack.
SCP for shelf processor circuit pack
MIU for maintenance interface circuit pack
OPC for options controller circuit pack
OWII, OW12 for an orderwire circuit pack
OLAG1 to OLAG8 for optical line amplifiers
HPTG1 to HPTG8 for high performance transmitters

first chan no 1 to 24. This is either the timeslot number for the STS-1 signal of the first STS-1 signal of the three making up an STS-3c (concatenated) signal.

last chan no 3, 6, 12, 15, 18, 21 or 24. This is the thrid of the three continuous timeslots in an sts-3c (concatenated) signal.

Port_id 1 to 3 for DS3 Mappers and STS-1 interfaces.

b. DS3 Performance Monitoring

The SCCM value for DS3 messages is "T3". All REPT PM TL1 messages have a LOCN of "NEND".

Performance Measurement test	MONTYPE	DIRN	Sybase column name
Line Coding Violation	CVL	ZA	lcv
Line Error Second	ESL	ZA	les
Line Severely Errored Second	SESL	ZA	lses
Path Coding Violation	CVP	AZ	tpcv
		ZA	pcv
Path Error Second	ESP	AZ	tpes
		ZA	pes
Path Severely Errored Second	SESP	AZ	tpses
		ZA	pses

TABLE 1 (continued)

Path Severely Errored Frame Second	OOF	AZ	tpsefs
		ZA	psefs
Path AIS Seconds	AISS	AZ	tpaiss
		ZA	paiss
Path Unavailable Seconds	UASP	AZ	tpuas
		ZA	puas
Protection Switch Count	PSC	NA	psc
Protection Switch Duration	PSD	NA	psd
Laser bias current level	LBCL	NA	lbcl
Laser power intensity transmitted	LPT	NA	lpt

c. **STS1 Performance Monitoring**

The SCCM value for STS1 messages is "STS1". All REPT PM TL1 messages have a LOCN of "NEND".

Performance Measurement test	**MONTYPE**	**DIRN**	**Sybase column name**
Line Coding Violation	CVL	ZA	lcv
Line Error Second	ESL	ZA	les
Line Severely Errored Second	SESL	ZA	lses
Line Unavailable Seconds	UASL	AZ	tluas
		ZA	luas
Line Bipolar coding violation	BCVL	ZA	lbcv
Line Bipolar errored seconds	BESL	ZA	lbes
Line Bipolar severely errored seconds	BSESL	ZA	lbses
Laser bias current level	LBCL	NA	lbcl
Laser power intensity transmitted	LPT	NA	lpt

TABLE 1 (continued)

d. **OC12 Performance Monitoring**

The SCCM value for OC12 messages is either "T4X8" or "OC12". All REPT PM TL1 messages have a LOCN of "NEND".

Performance Measurement test	MONTYPE	DIRN	Sybase column name
Line Coding Violation	CVL	ZA	lcv
Line Error Second	ESL	ZA	les
Line Severely Errored Second	SESL	ZA	lses
Section Coding Violation	CVS	ZA	s_cv
Section Error Second	ESS	ZA	s_es
Section Severely Errored Second	SESS	ZA	s_ses
Section Severely Errored Frame Second	OOF	ZA	s_sefs
Protection Switch Count	PSC	NA	psc
Protection Switch Duration	PSD	NA	psd
Laser bias current level	LBCL	NA	lbcl
Laser power intensity transmitted	LPT	NA	lpt

e. **OC48 Performance Monitoring**

The SCCM value for OC48 messages is either "T9X" or "OC48". All REPT PM TL1 messages have a LOCN of "NEND".

Performance Measurement test	MONTYPE	DIRN	Sybase column name
Line Coding Violation	CVL	ZA	lcv
Line Error Second	ESL	ZA	les
Line Severely Errored Second	SESL	ZA	lses
Section Coding Violation	CVS	ZA	s_cv
Section Eroror Second	ESS	ZA	s_es
Section Severely Errored Second	SESS	ZA	s_ses
Section Severely Errored Frame Second	OOF	ZA	s_sefs
Protection Switch Count	PSC	NA	psc

TABLE 1 (continued)

Protection Switch Duration	PSD	NA	psd
Laser bias current level	LBCL	NA	lbcl
Laser power intensity transmitted	LPT	NA	lpt

f. Performance Nominal Date and Time Calculation

The rpt_dt (report date-time stamp) for the SONET performance nominal messages will be computed based upon the OPC date-time stamp and not that of the Network Element.

A single REPT PM message is received with no detail when all NEs within the OPC span of control are nominal. For example:

```
 O04246 95-11-29 19:27:37
A 89266 REPT PM T3
;
```

The date-time stamp is for the OPC, not for the network element.

According to the TL1 interface description, the OPC retrieves PM data from each NE beginning 5 minutes after the hour. The actual time that the TL1 message is sent to SONM depends on the quantity of NEs in the span of control, the quantity of facilities provisioned, and the quantity of non-zero counts.

We have observed that the messages are received at least one hour after the time the OPCs poll the NEs.
The rpt_dt which will be stored in ODB will be based upon the OPC date-time stamp. 2 hours will be substracted from OPC time and rounded down to the whole hour.

For instance, the above REPT PM message would be parsed and inserted into the ODB with a aid value of NULL, 3600 seconds in the interval, and a rpt_dt of "11/29/95 17:00".

TABLE 1 (continued)

SONET performance data is collected from two sources: PAVE and SONM. PAVE reports are sent to ODB once a day and include daily summaries. SONM data are sent in near-realtime via the LSE.

1. pave_reports

The pave_reports table is loaded "as-is" from the PAVE system.

site_code	char(6)	
p_equip_alpha	char(6)	Alpha system designator
p_netype	char(4)	Device type (LTE or TBM)
p_level	char(6)	Service level (OC48, OC12, or DS3)
p_line	char(3)	NE line
l_dir	char(1)	Direction (T or R)
p_date	char(8)	Date as YYYMMDD
p_span	char(1)	Span. L=line, P=path, S=Section
ld_dt	datetime	Load date and time. The date and time the row was loaded into ODB.
p_percol	smallint	Number of periods collected (1 if collected OK)
p_permis	smallint	Number of periods missed (1 if not collected)
p_pererr	smallint	Number of error periods (1 if errors in record)
es	int	Errored seconds.
ses	int	Severely errored seconds.
sefs	int	SEES count
uas	int	Unavailable seconds
aiss	int	Alarm indication signal seconds

2. sonet_ds3_reports

tid	char(6)	Source identifier in found inthe TL1 message.
aid	varchar(20)	The access identifier of the network element reporting the PM data. The AID can be used to pinpoint the exact location on the shelf where the PM data is being sent from.
rpt_dt	datetime	The report date and time is obtained with the change of state message generated by the data acquisition process.
dtl_key	numeric(15)	Detail key. Points to a row in the sonet_ds3_detail table.
ld_dt	datetime	The date and time that the row was inserted into the table.

TABLE 2

3. sonet_ds3_detail

dtl_key	numeric(15)	
vldty	smallint	Validity indicator, 0=incomplete, 1=complete
sii	int	Seconds in inteval
lcv	int	Line coding violation
les	int	Line error second
lses	int	Line severely errored second
tpcv	int	Transmit path code violation
pcv	int	Receive path code violation
tpes	int	Transmit path error second
pes	int	Receive path error second
tpses	int	Transmit path severely error second
pses	int	Receive path severely error second
tpsefs	int	Transmit path severely error frame second
psefs	int	Receive path severely error frame second
tpaiss	int	Transmit path ais seconds
paiss	int	Receive path ais seconds
tpuas	int	Transmit path unavailable seconds
puas	int	Receive path unavailable seconds
psc	int	Protection switch count
psd	int	Protection switch count

4. sonet_sts1_reports

tid	char(6)	Source identifier in found in the TL1 message.
aid	varchar(20)	The access identifier of the network element reporting the PM data. The AID can be used to pinpoint the exact location on the shelf where the PM data is being sent from.
rpt_dt	datetime	The report date and time is obtained with the change of state message generated by the data acquisition process.
dtl_key	numeric(15)	Detail key. Points to a row in the sonet_sts1_detail table.
ld_dt	datetime	The date and time that the row was inserted into the table.

TABLE 2 (continued)

5. sonet_sts1_detail

dtl_key	numeric(15)	
vldty	smalling	Validity indicator, 0=incomplete, 1=complete
sii	int	Seconds in interval
lcv	int	Receive line coding violation
les	int	Receive line error seconds
lses	int	Receive line severely errored seconds
tluas	int	Transmit line unavailable seconds
luas	int	Receive line unavailable seconds
lbcv	int	Receive line bipolar coding violation
lbes	int	Receive line bipolar errored seconds
lbses	int	Receive line bipolar severely errored seconds

6. sonet_oc12_reports

tid	char(6)	Source identifier in found in the TL1 message.
aid	varchar(20)	The access identifier of the network element reporting the PM data. The AID can be used to pinpoint the exact location on the shelf where the PM data is being sent from.
rpt_dt	datetime	The report date and time is obtained with the change of state message generated by the data acquisition process.
dtl_key	numeric(15)	Detail key. Points to a row in the sonet_co12_detail table.
ld_dt	datetime	The date and time that the row was inserted into the table.

7. sonet_oc12_detail

dtl_key	numeric(15)	
vldty	smallint	Validity indicator, 0=incomplete, 1=complete
sii	int	Seconds in interval
lcv	int	Line coding violation
les	int	Line error second
lses	int	Line severe error second
s_cv	int	Section coding violation
s_es	int	Section error second
s_ses	int	Section severely errored second
s_sefs	int	Section severely errored frame seconds
psc	int	Protection switch count
pds	int	Protecton switch duration
lbcl	int	Laser bias current level
lpt	int	Laser power intensity transmitted

TABLE 2 (continued)

8. sonet_oc48_reports

tid	char(6)	Source identifier in found in the TL1 message.
aid	varchar(20)	The access identifier of the network element reporting the PM data. The AID can be used to pinpoint the exact location on the shelf where the PM data is being sent from.
rpt_dt	datetime	The report date and time is obtained with the change of state message generated by the data acquisition process.
dtl_key	numeric(15)	Detail key. Points to a row in the sonet_co12_detail table.
ld_dt	datetime	The date and time that the row was inserted into the table.

9. sonet_oc48_detail

dtl_key	numeric(15)	
vldty	smallint	Validity indicator, 0=incomplete, 1=complete
sii	int	Seconds in interval
lcv	int	Line coding violation
les	int	Line error second
lses	int	Line severe error second
s_cv	int	Section coding violation
s_es	int	Section error second
s_ses	int	Section severely errored second
s_sefs	int	Section severely errored frame seconds
psc	int	Protection switch count
pds	int	Protecton switch duration
lbcl	int	Laser bias current level
lpt	int	Laser power intensity transmitted

TABLE 2 (continued)

Column List for table: ATT-EQUIP

ATT_LTE_STN_CODE	int
ATT_LTE_STN_LINK	int
ATT_LTE_EQUIP_CODE	int
ATT_LTE_EQUIP_ALPHA	char(3)
ATT_LTE_MUX_LEVEL	char(4)
ATT_LTE_SLOT_NBR	int
ATT_LTE_SIDE	char(1)
ATT_LTE_TX_RX	char(1)
ATT_LTE_TRANS_TYPE	char(2)
ATT_DS3MU_EQUIP_CODE	int
ATT_DS3MU_EQUIP_ALPHA	char(3)
ATT_DS3MU_MUX_LEVEL	char(4)
ATT_DS3MU_SLOT_NBR	int
ATT_DS3MU_SIDE	char(1)
ATT_DS3MU_TX_RX	char(1)
ATT_DS3MU_MONITOR_FLAG	char(1)
ATT_DS3MU_CKT_TRUNK_TYP	char(12)
ATT_DS3MU_PARITY	char(1)
ATT_DS3MU_JUNC_TERM	int

Column List for table: CUSTOMER

	char(12)
CUST_CIRC_ID	binary(8)
TRUNK_ID	char(1)
CUST_MULTI_PT_FLAG	char(8)
CUST_CODE	varchar(30)
CUST_NAME	

Column List for table: CUSTOMER_CIRC

	char(8)
	binary(8)
CUST_CIRC_ID8	char(1)
TRUNK_ID	char(8)
CUST_MULTI_PT_FLAG	char(30))
CUST_CODE	
CUST_NAME	

TABLE 3

Column List for table: DS3_ROUTE

DS3_STN_CD	int
DS3_EQUIP_CD	int
DS3_EQUIP_ALPHA	char(3)
DS3_CLOT_NBR	int
DS3_TRUNK_ID	int
DS3_SEQ_NBR	int
SEG_SEQ_NBR	int
DS3_DIR	char(1)
SYS_STRUNK_ID	int
SYS_STRUNK_REV	smallint
SYS_STRUNK_TYPE	char(1)
DS3_CONN_TYPE	char(1)
DS3_MON_PNT	smallint

Column List for table: DXC31

DXC31_DCM_EQUIP	char(10)
DXC31_DCM_ALPHA	char(3)
DXC31_DCM_PORT	int
DXC31_SITE	char(6)
DXC31_EQUIP	char(10)
DXC31_ALPHA	char(3)
DXC31_SLOT	int

Column List for table: DXC31_ALT

DXC31_DCM_EQUIP	char(10)
DXC31_DCM_ALPHA	char(3)
DXC31_DCM_PORT	int
DXC31_SITE	char(6)
DXC31_EQUIP	char(10)
DXC31_ALPHA	char(3)
DXC31_SLOT	int

Column List for table: EQUIP-TYPES

EQUIP_CODE	int
EQUIP_ID	char(10)
EQUIP_FUNCTION	char(1)
EQUIP_MEDIA_TYPE	char(1)
EQUIP_ALIAS_1	char(10)

TABLE 3 (continued)

EQUIP_ALIAS_2	char(10)
EQUIP_ALIAS_3	char(10)
EQUIP_ALIAS_4	char(10)
EQUIP_MUX_LVL_1	char(4)
EQUIP_MUX_LVL_2	char(4)
EQUIP_MUX_LVL_3	char(4)
EQUIP_MUX_LVL_4	char(4)

Column List for table: FIBER_XREF

FIBER_SYS_STN1_CD	int
FIBER_SYS_STN2_CD	int
FIBER_SYS_ALPHA	char(3)
FIBER_SYS_EQUIP_CODE	int
FIBER_SYS_STATUS	char(1)
FIBER_SEQ_NBR	int
FIBER_FROM_STATION_CODE	int
FIBER_TO_STATION_CODE	int
FIBER_PR_ALPHA	char(3)
FIBER_TYPE_CNCT	char(1)
FIBER_PR_EQUIP_CODE	int

TABLE 3 (continued)

Column List for table: MUX
(Note: The MUX table contains only channel capacity and does not relate to other topology tables.)

MUX_LEVEL	char(4)
MUX_CHANL_CAPY	int

Column List for table: RADIO_DREI

RADIO_DREI_STN1_CD	int
RADIO_DREI_STN2_CD	int
RADIO_DREI_ALPHA	char(3)
RADIO_DREI_EQUIP_CD	Int
RADIO_SEQ_NBR	int
RADIO_SYS_STN1_CD	int
RADIO_SYS_STN2_CD	int
RADIO_SYS_ALPHA	char(3)
RADIO_SYS_EQUIP_CD	int

Column List for table: RADIO_ROUTE

RADIO_SYS_STN1_CD	int
RADIO_SYS_STN2_CD	int
RADIO_SYS_ALPHA	char(3)
RADIO_SYS_EQUIP_CD	int
RADIO_SEQ_NBR	int
RADIO_STN_CD	int
RADIO_TENTHS_MILES	int

Column List for table: SEGMENT

SEG_TYPE	char(1)
SEG_STRUNK_DIR	smalling
SEG_STRUNK_ID	binary(8)
SEG_OCCUPY_TAS	varchar(36)
TRUNK_ID	binary(8)
SEG_SEQ_NBR	int
SEG_TYPE_CONNECT	char(1)
SEG_EQUIP_FUNCTION	char(1)
SEG_SLOT1_STATION_CODE	int
SEG_SLOT1_STATION_LINK	int
SEG_SLOT1_EQUIP_CODE	int

TABLE 3 (continued)

SEG_SLOT1_EQUIP_ALPHA	char(3)
SEG_SLOT1_MUX_LEVEL	char(4)
SEG_SLOT1_SLOT_NBR	int
SEG_SLOT1_SLOT_SIDE	char(1)
SEG_SLOT1_SLOT_TX_RX	char(1)
SEG_SLOT2_STATION_CODE	int
SEG_SLOT2_STATION_LINK	int
SEG_SLOT2_EQUIP_CODE	int
SEG_SLOT2_EQUIP_ALPHA	char(3)
SEG_SLOT2_MUX_LEVEL	char(4)
SEG_SLOT2_SLOT_NBR	int
SEG_SLOT2_SLOT_SIDE	char(1)
SEG_SLOT2_SLOT_TX_RX	char(1)
SEG_MILEAGE	real
SEG_RESTORE	char(1)
SEG_RESTORE_ID	varchar(14)

Column List for table: STATION

STATION_CODE	int
STATION_ID	char(6)
STATION_NAME	varchar(32)
STATION_DIVSN	char(2)
STATION_STATUS	char(1)
STTAION_TYPE	char(2)
STATION_ACTUAL_ENTITY	char(1)
STTAION_LAT_SEC	int
STATION_LONG_SEC	int

Column List for table: STATION-NACS

STATION_NACS_ID	char(6)
STATION_CODE	int
STATION_ID	char(6)
STATION_NAME	varchar(32)
STATION_DIVSN	char(2)
STATION_STATUS	char(1)
STATION_TYPE	char(2)
STATION_ACTUAL_ENTITY	char(1)
STATION_LAT_SEC	int
STATION_LONG_SEC	int

TABLE 3 (continued)

Column List for table: SYS_ROUTE

SYS_STN1_CD	int
SYS_STN2_CD	int
SYS_TECH	char(1)
SYS_ALPHA	char(3)
SYS_EQUIP_CD	int
SYS_SEQ_NBR	int
SYS_ROUTE_STN_CD	int
SYS_TRUNK_ID	int

Column List for table: TRUNK

TRUNK_ALT_KEY_LEVEL	char(1)
TRUNK_ALT_KEY_STATUS	char(1)
TRUNK_BLOCK	char(4)
TRUNK_ID	binary(8)
TRUNK_PT1_STATION_CODE	int
TRUNK_PT1_STATION_LINK	int
TRUNK_PT1_EQUIP_CODE	int
TRUNK_PT1_EQUIP_ALPHA	char(3)
TRUNK_PT1_MUX_LEVEL	char(4)
TRUNK_PT1_SLOT_NBR	int
TRUNK_PT1_SLOT_SIDE	char(1)
TRUNK_PT1_SLOT_TX_RX	char(1
TRUNK_PT1_HANDOFF	int
TRUNK_PT1_TAS_MUX	char(36)
TRUNK_PT2_STATION_CODE	int
TRUNK_PT2_STATION_LINK	int
TRUNK_PT2_EQUIP_CODE	int
TRUNK_PT2_EQUIP_ALPHA	char(3)
TRUNK_PT2_MUX_LEVEL	char(4)
TRUNK_PT2_SLOT_NBR	int
TRUNK_PT2_SLOT_SIDE	char(1)
TRUNK_PT2_SLOT_TX_RX	char(1)
TRUNK_PT2_HANDOFF	int
TRUNK_PT2_TAS_MUX	char(36)
TRUNK_SIZE	binary(8)
TRUNK_TYPE	char(1)
TRUNK_PATCH1_FLG	char(1)
TRUNK_PATCH2_FLG	char(1)
TRUNK ASGN	char(1)
TRUNK TECH	char(1)
TRUNK_LINE_CODE	char(1)
TRUNK_FRAME	char(1)

TABLE 3 (continued)

TRUNK_END1_FRAME		char(1)
TRUNK_END2_FRAME		char(1)
TRUNK_SIGNAL		char(1)
TRUNK_FIBER_FLG		char(1)
TRUNK_SATELLITE		char(1)
TRUNK_PRIORITY	int	

TABLE 3 (continued)

```
RWCRegexp MONTH  "[0-1][0-9]"
RWCRegexp DAY            "[0-3][0-9]"
RWCRegexp YEAR           "[0-9][0-9]"
RWCRegexp MDY            MONTH "/" DAY "/" YEAR
RWCRegexp YMD            YEAR "-" MONTH "-" DAY

RWCRegexp HOUR           "[0-2][0-9]"
RWCRegexp MIN_SEC        "[0-5][0-9]"
RWCRegexp HMS            HOUR ":" MIN_SEC ":" MIN_SEC
RWCRegexp MDY_HMS        MDY " " HMS
RWCRegexp YMD_HMS        YMD " " HMS

initialization {
        initialize();
}

event PERF_NOM {
        segnum          "[0-9]+ " {}
        jul             "[0-9]+ " {}
        site_id  "..."    {}
        msg_type        "CN"   {}
        eq_type         "[0-9]" {}
        rpt_type        ": PN " {}
        time_stamp MDY_HMS {}
        shelf    "[0-9][0-9]" {}
        comma "," {}
        card     "[0-9][0-9]" {}
        east_data       " E [^ ] + " {}
        west_data       " W[^ ] + " {}
        eom     "COMPL[ \r\n]*"
        {
        store ("esfmu", catPipe("30",seqnum,jul,site_id,conv_shelf(eq_type, shelf),card,"87",
        time_stamp,cat(eq_type,shelf),east_data,west_data));
        }
}

event SONET {
        seqnum          "[0-9]+ " {}
        jul      "[0-9]+ " {}
        reptpm  "REPTPM " {}
        sitecodeid      "....." {}
        sp              "[]+" {}
        tid      "....." {}
```

TABLE 4

```
        rpt_dt   YMD_HMS {}
        fields   ".*;"    {}
        eom      "[^+]*"
        {
        sonet(seqnum,jul, sitecodeid,tid,rpt_dt, fields);
        }
}

event GEN2CRUNCH0 {
        seqnum          "[0-9]+ " {}
        jul       "[0-9]+ " {}
        site_id  "..." {}
        msg_type        "CN" {}
        eq_type         " [0-9] " {}
        rpt_type        ": E" {}
        dir       "."   {}
        sp        " "   {}
        time_stamp MDY_HMS {}
        shelf    "[0-9][0-9]" {}
        comma           "," {}
        card     "[0-9][0-9]" {}
        how many        "[0]" {}
        fields   "[0-9?,]+" {}
        eom      "COMPL[ \r\n]*"
        {
        store ("esfmu", catPipe("40",seqnum,jul,site_id,
                conv_shelf(eq_type,shelf),card,"87",time_stamp,cat(eq_type,shelf),dir,
                fill-field-listO(fields,"7")));
        }
}

event GEN2_typeques {
        seqnum          "[0-9]+ " {}
        jul             "[0-9]+ " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": E" {}
        dir             "." {}
        sp        " " {}
        time_stamp MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma "," {}
        card     "[0-9][0-9]" {}
        how_many  " [?]" {}
        fields          "[0-9?,]+" {}
        eom      "COMPL[ \r\n]*"
```

TABLE 4 (continued)

```
        {
        store ("esfmu", catPipe("42",seqnum,jul,site_id,
                conv_shelf(eq_type,shelf),card,"87",time_stamp,cat(eq_type,shelf),dir,
                fill_field_listx(fields, "7")));
        }
}

event GEN_type1 {
        seqnum          "[0-9]+ " {}
        jul     "[0-9]+ " {}
        site_id  "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": E" {}
        dir     "." {}
        sp              " " {}
        time_stamp MDY_HMS {}
        shelf   "[0-9][0-9]" {}
        comma           "," {}
        card    "[0-9][0-9]" {}
        how_many  " 1" {}
        fields  "[0-9?,]+" {}
        eom     "COMPL[ \r\n]*"
        {
        store ("esfmu", catPipe("41",seqnum,jul,site_id,
                conv_shelf(eq_type,shelf),card,"87",time_stamp,cat(eq_type,shelf),dir,
                fill_field_list1(fields, "11")));
        }
}

event DXC_P {
        seqnum          "[0-9]+ " {}
        jul             "[0-9]+ " {}
        site_id         "..." {}
        msg_type        "ST" {}
        eq_type         "[0-9]" {}
        indicator       ": P " {}
        time_stamp MDY_HMS {}
        pppp    "[0-9]+" {}
        berl    "[0-9]+" {}
        perp    "[0-9]+" {}
        cvl     "[0-9]+" {}
        cvp     "[0-9]+" {}
        fpe     "[0-9]+" {}
        oofp    "[0-9]+" {}
        esl     "[0-9]+" {}
        esp     "[0-9]+" {}
```

TABLE 4 (continued)

```
        sesl    "[0-9]+" {}
        sesp    "[0-9]+" {}
        cses    "[0-9]+" {}
        uasp    "[0-9]+" {}
        psc     "[0-9]+" {}
        psd     "[0-9]+" {}
        pes     "[0-9]+" {}
        fes     "[0-9]+" {}
        aiss    "[0-9]+" {}
        fbe     "[0-9]+" {}
        cpe             "[0-9]+" {}
        loss            "[0-9]+" {}
        eom     "COMPL" {}
        eoml    "[\r\n]*"
        {
        store("dxc", catPipe("50",seqnum,jul,site_id,cat(matches("ST",msg_type,"A"),
                matches("1",eq_type, "A"), matches("2",eq_type,"B"), matches("3",eq_type,"C"),
                matches("4",eq_type,            "D"), matches("5",eq_type, "E"),
matches("6",eq_type, "F"),          matches("7",eq_type,"G"), matches("8",eq_type, "H"),
matches("9", eq_type, "I"),         matches("10",eq_type,"J")), pppp,"140", time_stamp,eq_type,
                cat(adjust(cvl,"10","0"), adjust(cvp,"10","0"), adjust(fpe,"10","0"),
                adjust(oofp,"10","0"), adjust(es1,"10","0"), adjust(esp,"10","0"),
                adjust(ses1,"10","0"), adjust(sesp,"10","0"), adjust(cses,"10","0"),
adjust(uasp,"10","0"),          adjust(psc,"10",""), adjust(psd,"10","0"), adjust(pes,"10","0"),
                adjust(fes,"10","0"), adjust(aiss,"10","0"), adjust(fbe,10","0"),
                adjust(cpe,"10","0"),adjust(loss,10","0"))));
        }
}

event DXC-PN {
        seqnum          "[0-9]+ " {}
        jul             "[0-9]+ " {}
        site_id         "..." {}
        msg_type        "ST" {}
        eq_type         "[0-9]" {}
        indicator       ": P " {}
        time_stamp MDY_HMS {}
        fields  "[0-9\-]+" {}
        eom     "COMPL" {}
        eom1    "[\r\n]*"
        {
        store ("dxc",catPipe("51",seqnum,jul,site_id,
                cat(matches("ST",msg_type,"A"), matches("1",eq_type,"A"),
                matches("2",eq_type,"B"), matches("3",eq_type,"C"),
                matches("4",eq_type,"D"), matches("5",eq_type,"E"), matches("6",eq_type, "F"),
                matches("7",eq_type,"G"), matches("8",eq_type,"H"), matches("9",eq_type,"I"),
```

TABLE 4 (continued)

```
                matches("10",eq_type,"J")),"0","140",time_stamp,eq_type,fields));
        }
}

event DXC_PI {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "ST" {}
        eq_type         "[0-9]" {}
        indicator       ": PI" {}
        time_stamp  MDY_HMS {}
        fields          "[---0-9]+" {}
        eom             "COMPL[ \r\n]*"
        {
        store ("dxc",catPipe("52",seqnum,jul,site_id,
                cat(matches("ST",msg_type,"A"),matches("1",eq_type,"A"),matches("2",eq_type,"B
                "),
                matches("3",eq_type,"C"),matches("4",eq_type,"D"),
                matches("5",eq_type,"E"),matches("6",eq_type,"F"),matches("7",eq_type,"G"),
                matches("8",eq_type,"H"),matches("9",eq_type,"I"),matches("10",eq_type,"J"),
                "0","140",time_stamp,eq_type,fields));
        }
}

event GEN315COMPL1 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id  "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp  MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card    "[0-9][0-9]" {}
        dir     "[EW]" {}
        typ     "1" {}
        fields          "[0-9?,\-]+" {}
        eom     " COMPL[\r\n]*"
        {
        store ("gen3",catPipe("60",seqnum,jul,site_id,
                conv_shelf(eq_type,shelf),card,"87",
                time_stamp,cat(eq_type,shelf),dir,gen3_compl(fields)));
        }
}
```

TABLE 4 (continued)

```
event GEN315DASHCOMPL1 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp  MDY_HMS {}
        shelf   "[0-9][0-9]" {}
        comma           "," {}
        card    "[0-9][0-9]" {}
        dir     "[EW]" {}
        type    "[1]" {}
        dash    " - " {}
        strt    "[0-9]+" {}
        sp      " " {}
        fields  "[0-9\,\-]+" {}
        com     " COMPL[\r\n]*"
        {
        store ("gen3",catPipe("60",seqnum,jul,site_id,
                conv_shelf(eq_type,shelf),card,"87",
                time_stamp,cat(eq_type,shelf),dir,gen3_incom("DC",seqnum,jul,site_id,
                msg_type,eq_type,rpt_type,time_stamp,shelf,card,dir,type,fields)));
        }
}

event GEN315INCOMNODASHNOCOMPLI {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp  MDY_HMS {}
        shelf   "[0-9][0-9]" {}
        comma           "," {}
        card    "[0-9][0-9]" {}
        dir     "[EW]" {}
        type    "1" {}
        sp      " " {}
        fields  "[0-9\,\-]+" {}
        eom     "[\r\n]*"
        {
        gen3_incom(" NN",seqnum,jul,site_id,msg_type,eq_type,rpt_type,time_stamp,
                shelf,card,dir,type,fields);
        }
}
```

TABLE 4 (continued)

```
event GEN315INCOMDASHNOCOMPL1 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp  MDY_HMS {}
        shelf   "[0-9{2}" {}
        card    ",[0-9]{2}" {}
        dir     "[EW]" {}
        type    "[1]" {}
        dash    " - " {}
        strt    "[0-9]+" {}
        sp      " " {}
        fields  "[0-9\,\-]+" {}
        com     "[\r\n]*"
        {
        gen3_incom("DN",seqnum,jul,site_id,msg_type,eq_type,rpt_type,time stamp,
                shelf,card,dir,type,fields);
        }
}

event GEN315INCOMDASHNOCOMPL0 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp  MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card    "[0-9][0-9]" {}
        dir     "[EW]" {}
        type    "[0]" {}
        dash    " - " {}
        strt    "[0-9]+" {}
        sp      " " {}
        fields  "[0-9\,\-]+" {}
        com     "[\r\n]*"
        {
        }
}

event E1MU {
        seqnum          "[0-9] + " {}
```

TABLE 4 (continued)

```
        jul     "[0-9] + " {}
        site_id "..." {}
        msg_type        "E1M" {}
        rpt_type        ": P" {}
        time_stamp  MDY_HMS {}
        shelf   "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        comma 1         "," {}
        mp      "[0-9]" {}
        fields  "[0-9?,]+" {}
        eom     " COMPL" {}
        eom1    "[\r\n]*"
        {
        store ("dxc",catPipe("80",seqnum,juL,site_id,shelf,card,"153",
                time_stamp,mp,gen3_compl(fields)));
        }
}

event E1MUPI {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "E1M" {}
        rpt_type        ": PI" {}
        time_stamp  MDY_HMS {}
        shelf           "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        fields  "[0-9,\-]+" {}
        eom     " COMPL[\r\n]*"
        {
        store ("dxc",catPipe("82",seqnum,jul,site_id,shelf,card,"153",time-stamp,fields));
        }
}
```

TABLE 4 (continued)

```
event E1MUPN {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "E1M" {}
        rpt_type        ": PN" {}
        time_stamp  MDY_HMS {}
        shelf   "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        fields  "[0-9?,---]+" {}
        eom     " COMPL[\r\n]*"
        {
        store ("dxc",catPipe("81",seqnum,jul,site_id,shelf,card,time_stamp,fields));
        }
}

event E1MU2 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "E1M" {}
        rpt_type        ": P" {}
        time_stamp  MDY_HMS {}
        shelf   "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        comma1          "," {}
        mp      [0-9]+" {}
        fields   "[0-9?,]+" {}
        eom     " COMPL" {}
        eom1    "[\r\n]*"
        {
        store ("dxc",catpipe("80",seqnum,jul,site_id,shelf,card,"153",
                time_stamp,mp,gen3_compl(fields)));
        }
}

event E1MUPI2 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "E1M" {}
        rpt_type        ": PI" {}
        time_stamp  MDY_HMS {}
        shelf           "..." {}
        comma           "," {}
```

TABLE 4 (continued)

```
        card    "[0-9]+" {}
        fields  "[0-9,\-]+" {}
        eom     " COMPL[\r\n]*"
        {
        store ("dxc",catPipe("82",seqnum,jul,site_id,shelf,card,time_stamp,fields));
        }
}

event E1MUPN2 {
        seqnum          "[0-9] + " {}
        jul     "[0-9] + " {}
        site_id         "..." {}
        msg_type        "E1M" {}
        rpt_type        ": PN" {}
        time_stamp  MDY_HMS {}
        shelf   "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        fields  "[0-9?,---]+" {}
        eom     " COMPL[\r\n]*"
        {
        store ("dxc",catPipe("81",seqnum,jul,site_id,shelf,card,time_stamp,fields));
        }
}

event DS3MUALLNOM15 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp  MDY_HMS {}
        sp1     " " {}
        shelf   "..." {}
        comma           "," {}
        card    "[0-9]+" {}
        type    " 15" {}
        inf     " All" {}
        fields  "data is nominal"  {}
        eom     " COMPL[\r\n]*"
        {
        store ("dxc",catPipe("70",seqnum,jul,site_id,shelf,card,"115",time_stamp,"0"));
        }
}

event DS3MUALLNOM24 {
        seqnum          "[0-9] + " {}
```

TABLE 4 (continued)

```
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        sp1     " " {}
        shelf   "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 24" {}
        inf             " All" {}
        fields          "data is nominal" {}
        eom             " COMPL[\r\n]*"
        {
        }
}

event DS3M24dat {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 24" {}
        inf             " DAT" {}
        dt              "[0-9/]+" {}
        eom             "[\r\n]*"
        {
        }
}

event DS3MUALLNOM24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
```

TABLE 4 (continued)

```
        type            " 24" {}
        inf     " All" {}
        fields  "data is nominal" {}
        eom     " COMPL[\r\n]*"
        {
        }
}

event DS3MUINF {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " INF" {}
        fields          "[0-9?,A-Z]+" {}
        eom             "[\r\n]*"
        {
        ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,spl,shelf,card,type, inf,fields);
        }
}

event DS3MUINF24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " INF" {}
        fields          "[0-9?,A-Z]+" {}
        eom             "[\r\n]*"
        {
        }
}
```

TABLE 4 (continued)

```
event DS3MULIN {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        lin             " LIN" {}
        fields          "[0-9?,Z-Z]+" {}
        eom             "[\r\n]*"
        {
        ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,spl,shelf,card,type,lin,fields);
        }
}

event DS3MULIN24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 24" {}
        lin             " LIN" {}
        fields          "[0-9?,Z-Z]+" {}
        eom             "[\r\n]*"
        {
        }
}

event DS3MUPAR1 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
```

TABLE 4 (continued)

```
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        par     " PAR" {}
        fields          "[0-9]+" {}
        eom             "[\r\n]*"
        {
        ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,spl,shelf,card,type, par,fields);
        }
}

event DS3MUPAR124 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 24" {}
        par     " PAR" {}
        fields          "[0-9]+" {}
        eom             "[\r\n]*"
        {
        }
}


event DS3MUPARCOMPL {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " PAR" {}
        dash            " - "
```

TABLE 4 (continued)

```
        fields          "[0-9 %.\-]+" {}
        eom1            "COMPL" {}
        eom             "[\r\n]*"
        {
        store ("dxc",catPipe("70",seqnum,jul,site_id,shelf,card,"115"
                ,time_stamp,ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,sp1,
                shelf,card,type,"PDC",fields)));
        }
}

event DS3MUPARdashnoCOMPL {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " PAR" {}
        dash            " - " {}
        fields          "[0-9 %.\-]+" {}
        eom             "[\r\n]*"
        {
        ds3 (seqnum,jul,site_id,msg_type,rpt_type,time_stamp,sp1,shelf,card,type,
                "PDN",fields);
        }
}

event DS3MUFEPCOMPL {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " FEP" {}
        dash            " - " {}
        fields          "[0-9 %.\-]+" {}
```

TABLE 4 (continued)

```
        eom1            "[M]*COMPL" {}
        eom     "[\r\n]*"
        {
        store ("dxc",catPipe("70",seqnum,jul,site_id,shelf,card,"115"
                ,time_stamp,ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,spl,
                shelf,card,type,"FDC",fields)));
        }
}

event DS3MUFEP1 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        par             " FEP" {}
        fields          "[0-9]+" {}
        eom             "[\r\n]*"
        {
        ds3 (seqnum,jul, site_id,msg_type,rpt_type,time_stamp,sp1,shelf,card,type,
                "FNN",fields);
        }
}

event DS3MUCBT1 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D" {}
        time_stamp      MDY_HMS {}
        sp1             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        par     " CBT" {}
        fields          "[0-9]+" {}
        eom             "[\r\n]*"
        {
        ds3(seqnum,jul,site_id,msg_type,rpt_type,time_stamp,spl,shelf,card,type,
```

TABLE 4 (continued)

```
                "CNN",fields);
        }
}

event DS3MUCBTdashnoCOMPL {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": D " {}
        time_stamp      MDY_HMS {}
        sp1             "  " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9]+" {}
        type            " 15" {}
        inf             " CBT" {}
        dash            " - "  {}
        fields          "[0-9 %.\-]+" {}
        eom             "[\r\n]*"
        {
        ds3 (seqnum,jul, site_id,msg_type, rpt_type, time_stamp, sp1, shelf,card,type,
                "CDN",fields);
        }
}


event OCSU3C12 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: P" {}
        time_stamp      MDY_HMS {}
        sp1             " 3C12 " {}
        shelf           "..." {}
        comma           "," {}
        port            "[0-9]| " {}
        sp              " " {}
        fields          "[0-9,]+" {}
        eom             "COMPL[\r\n]*"
        {
        store ("ocsu", catPipe("130",seqnum,jul,site_id,shelf,port,"181",
                time_stamp,gen3_compl(fields)));
        }
}
```

TABLE 4 (continued)

```
event OCSU3Cl2PN {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: PN" {}
        time_stamp  MDY_HMS {}
        spl     " 3C12 " {}
        shelf   "..." {}
        fields  "[0-9,\-]+" {}
        eom     "COMPL[\r\n]*"
        {
        store ("ocsu", catPipe("131",seqnum,jul,site_id,shelf,"0","181",
                time-stamp,fields));
        }
}

event OCSU3Cl2Pl {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: PI" {}
        time_stamp  MDY_HMS {}
        spl     " 3C12 " {}
        shelf   "..." {}
        fields  "[0-9,\-]+" {}
        eom     "COMPL[\r\n]*"
        {
        store ("oesu", catPipe("132",seqnum,jul,site_id,shelf,"0","181",
                time_stamp,fields));
        }
}

event OCSUOC3P {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: P" {}
        time_stamp  MDY_HMS {}
        spl             " OC3 " {}
        shelf           "..." {}
        comma           "," {}
        port            "[0-9]+ " {}
        sp      "  " {}
        fields  "[0-9,]+" {}
        eom     "COMPL[\r\n]*"
        {
        store ("ocsu", catPipe("140",seqnum,jul,site_id,shelf,port,"181",
```

TABLE 4 (continued)

```
                time_stamp,gen3_compl(fields)));
        }
}

event OCSUOC3PN  {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: PN" {}
        time_stamp      MDY_HMS {}
        sp1             " OC3 " {}
        shelf           "..." {}
        fields          "[0-9,\-]+" {}
        eom             "COMPL[\r\n]*"
        {
        store ("ocsu", catPipe("141",seqnum,jul,site_id,shelf,"0","181",
                time_stamp,fields));
        }
}

event OCSUOC3PI {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "OSU: PI" {}
        time_stamp      MDY_HMS {}
        sp1             " OC3 " {}
        shelf           "..." {}
        fields          "[0-9,\-]+" {}
        eom             "COMPL[\r\n]*"
        {
        store ("ocsu", catPipe("142",seqnum,jul,site_id,shelf,"0","181",
                time_stamp,fields));
        }
}

event PERF_POLL {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": E[EW]" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
```

TABLE 4 (continued)

```
        dir             "[EW][0-9]+" {}
        fields          "[0-9? ]+" {}
        eom             "COMPL[\r\n]*"
        {
        store ("esfmu", catPipe("10",seqnum,jul,site_id,conv_shelf(eq type,
                shelf),card,"87",time_stamp,
                cat(eq_type,shelf),dir,pp_fill(fields,"6")));
        }
}

event PERF_CSU {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": EC" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        status          "[0-9?]+" {}
        fields          "[0-9?]+" {}
        eom             "COMPL[\r\n]*"
        {
        store ("esfmu",catPipe("20",seqnum,jul,site_id, conv_shelf (eq_type, shelt),card,"87",
                time_stamp,cat(eq_type,shelf),"E",csufill_field-list(fields,"4")));
        }
}

event GEN315DASHCOMPL0 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[0]" {}
        dash            " - " {}
        strt            "0-9]+ " {}
        sp              " " {}
        fields          "[0-9,---]+" {}
```

TABLE 4 (continued)

```
        com             "COMPL[\r\n]*"
        {
        }
}

event GEN315INCOMNODASHNOCOMPL0 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[0]" {}
        sp              " " {}
        fields          "[0-9\,\-]+" {}
        eom             "[\r\n]*"
        {
        }
}

event GEN324hourcompl {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[01]" {}
        fields          "[0-9?,---]+" {}
        eom             "COMPL[\r\n]*"
        {
        }
}

event GEN324dash {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
```

TABLE 4 (continued)

```
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[01]" {}
        dash            "-" {}
        strt    "[0-9]+ " {}
        sp      " " {}
        fields  "[0-9,\-]+" {}
        com     "COMPL[\r\n]*"
        {
        }
}

event GEN324incomplete {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[01]" {}
        sp              " " {}
        fields          "[0-9,---]+" {}
        eom             "[\r\n]*"
        {
        }
}

event GEN324INCOMDASHNOCOMPL1 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "0-9]" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
```

TABLE 4 (continued)

```
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[EW]" {}
        type            "[01]" {}
        dash            " - " {}
        strt            "[0-9]+" {}
        fields          "[0-9,---]+" {}
        com             "[\r\n]*"
        {
        }
}

event GEN315COMPL0 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "CN" {}
        eq_type         "[0-9]" {}
        rpt_type        ": 15" {}
        time_stamp      MDY_HMS {}
        shelf           "[0-9][0-9]" {}
        comma           "," {}
        card            "[0-9][0-9]" {}
        dir             "[WE]" {}
        typ             "[0]} {}
        fields          "[0-9 ?,---]+" {}
        eom             "COMPL[\r\n]*"
        {
        }
}

event DS3MUPARCOMPL24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9] +" {}
        type            "24" {}
        inf             "PAR" {}
        dash            " - " {}
        fields          "[0-9 %.\-]+" {}
```

TABLE 4 (continued)

```
        eom1            "COMPL" {}
        eom             "[\r\n]*"
        {
        }
}

event DS3MUPARdashnoCOMPL24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9] +" {}
        type    "24" {}
        dash    " - " {}
        inf     "PAR" {}
        fields  "[0-9 %.\-]+" {}
        eom     "[\n\r]*"
        {
        }
}

event DS3MUFEPCOMPL24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9] +" {}
        type            "24" {}
        inf             "FEP" {}
        dash            " - " {}
        fields          ".*COMPL[\r\n]*"
        {
        }
}

event DS3MUFEP124 {
        seqnum          "[0-9] + " {}
```

TABLE 4 (continued)

```
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9] +" {}
        type    "24" {}
        par     "FEP" {}
        fields  "[0-9]+" {}
        eom     "[\r\n]*"
        {
        }
}

event DS3MUCBT124 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card            "[0-9] +" {}
        type            "24" {}
        par             "CBT" {}
        fields          "[0-9] + " {}
        eom             "[\r\n]*"
        {
        }
}

event DS3MUCBTdashnoCOMPL24 {
        seqnum          "[0-9] + " {}
        jul             "[0-9] + " {}
        site_id         "..." {}
        msg_type        "M3A" {}
        rpt_type        ": 24" {}
        time_stamp      MDY_HMS {}
        spl             " " {}
        shelf           "..." {}
        comma           "," {}
        card    "[0-9] +" {}
```

TABLE 4 (continued)

```
        type    "24" {}
        inf     "CBT" {}
        dash    " - " {}
        fields  "[0-9].*" {}
        eom     "[\r\n]*"
        {
        }
}
```

TABLE 4 (continued)

ESFMU

Not all ESFMUs are included in the ODB. Only those ESFMUs which appear in the SEGMENT and TRUNK topology tables are included. A separate table containing these ESFMUs is created and is used to filter out unwanted ESFMUs. This table is called the monitor_cntl table.

1. monitor_cntl

This table is used to control which ESFMUs are included in the ODB.

site_id	char(3)	
equip_alpha	char(3)	The three character designator for the equipment. For esfmu, this represents the shelf, the first character is blank.
port_nbr	numeric(6)	Port number. For esfmu, this is the card.
equip_code	smallint	Equipment code. 87=esfmu
src_cntl_code	smalling	Source Control Code. 0=production, 1=DDN Certification
circ_id	char(12)	Circuit ID
eff_dt	datatime	Effective date and time.
disc_dt	datetime	Discontinue date and time. The date and time that this monitor point is no longer effective.

2. odb_sites

This table is a list of all sites and relates the site_id with the site_nbr.

site_id	char(3)	Site identifier.
site_nbr	numeric(12)	Site number.

3. odb_equip_codes

This table is used to relate the equipment code with the equipment alpha identifier and the eq_typ.

equip_code	smalling	Equipment code. 87=esfmu
equip_alpha	char(3)	The three character designator for the equipment. For esfmu, this represents the shelf, the first character is blank.
eq_typ	char(3)	Equipment type. For esfmu, this would be "CNx" where x is the esfmu number from 0 through n.

TABLE 5

4. esfmu_reports

For each ESFMU performance messageis rd and is in the monitor_cntl table, there is an entry in the esfmu_reports table. Performance nominal messages are expanded out. The actual performance indicators, such as line errored seconds etc., are stored in the esfmu_detail table. This allows for data compression since repeated performance indicators are only stored once.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment. For esfmu, this represent the shelf, the first character is blank.
port_nbr	numeric(6)	Port number. For esfmu, this is the card.
slot_side	char(1)	Slot side. E=East, W=West.
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
dtl_key	numeric(15)	The key to the esfmu_detail table.
ld_dt	datetime	The date and time that the rwo was inserted into the table.

TABLE 5 (continued)

5. esfmu_detail

dtl_key	numeric(15)	
gen	smalling	Generation of the ESFMU (2=GEN 2, 3=GEN 3, duh!)
sii	int	seconds in interval
mms	int	Maintenance Mode Seconds
niss	int	Not-in_service seconds
res	int	Raw errored seconds.
les	int	Line Errored seconds
rses	int	Raw Severely errored seconds.
lses	int	Line Severely Errored Seconds
oof	int	Out of frame.
fss	int	Failed signal state.
csu_ss	int	CSU status byte
csu_esf_err	int	CSU ESF errors
scu_synch_es	int	CSU synchronous errored seconds
csu_synch_fs	int	CSU synchronous failed seconds
llos	int	Line Loss of signal seconds
lcv	int	Line Code Violation
psas	int	Path SEF/AIS seconds
paiss	int	Path Alarm Indication Signal Seconds
pcss	int	Path Controlled Slip Seconds
pes	int	Path Errored Seconds
pses	int	Path Severely Error Seconds
puas	int	Path Unavailable Seconds
pcv	int	Path Code Violations
fe_pcv	int	Path Code Violations - far end
fe_pes	int	Path Errored Seconds - far end
pesa	int	Path Errored Seconds - type A
fe_pesa	int	Path Errored Seconds - type A, far end
pesb	int	Path Errored Seconds - type B
fe_pesb	int	Path Errored Seconds - type B, far end
fe_pses	int	Path Severely Errored Seconds - far end
fe_psefs	int	Path Severely Errored Frame Seconds - far end
fe_pcss	int	Path Controlled Slip Seconds - far end
fe_paus	int	Path Unavailable Seconds - far end
fe_les	int	Line Errored Seconds - far end
lfec	int	Line Failure Count
pfec	int	Path Failure Count
fe_pfec	int	Path Failure Count - far end

TABLE 5 (continued)

6. esfmu_exceptions

This table contains esfmu messages whic are in error.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment. For esfmu, this represent the shelf, the first character is blank.
port_nbr	nmeric(6)	Port number. For esfmu, this is the card.
slot_side	char(1)	Slot side. E=East, W=West.
rpt_dt	datetime	report date and time. The date and time as "stamped" by the site controller.
Id_dt	datetime	The date and time that the row was inserted into the table.
msg_txt	varchar(255)	Actual text of the message as it was received from the LSE.

7. esfmu_cert_summary

This includes the summary of both gen2 and gen3 data for those monitor control points which have a source control code of "1".

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment. For esfmu, this represents the shelf, the first character is blank.
port_nbr	numeric(6)	Port number. For esfmu, this is the card.
slot_side	char(1)	Slot side. E=East, W=West.
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller. The time is set to "00:00:00".
ld_dt	datetime	The date and time that the rwo was inserted into the table.
ttl_rpts	int	The number of reports included in the daily summary.
rpt_stts	smallint	0=no reports for the day, 1=complete, 2=incomplete (not all 15-min intervals reporting)
les	int	Line errored seconds
lses	int	Line severe errored seconds.
res	int	Raw errored seconds.
oof	int	Out of frame.
fss	int	Failed signal state.
csu_es_err	int	Customer Service Unit, errored seconds.
csu_ses	int	Customer Service Unit, severely errored seconds.
csu_fss	int	Customer Service Unit, failed signal state.

TABLE 5 (continued)

BBDXC

1. bbdxc_reports

Each performance message from the Alcatel 1633 Broadband DXC is stored in the ODB. Unlike the ESFMUs, no attempt is made to filter out messages. A range of port numbers is stored in a signle row in the bbdxc_reports table. The first port number in a range is "port_nbr". The last port number in a range is "end_port_nbr". The port_nbr and the end_port_nbr may be the same.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
dtl_key	numeric(15)	The key to the bbdxc_detail table. A zero indicates performance nominal and a one (1) indicates a performance incomplete (all NULL).
ld_dt	datetime	The date and time that the row was inserted into the table.
end_port_nbr	numeric(6)	The last port number in a range of port numbers.

TABLE 5 (continued)

2. bbdxc_detail

The detail key is used internally by ODB to accomplish data compression and joins between the bbdxc_detail and the bbdxc_reports.

dtl_key	numeric(15)	Unique identifier for the bbdxc_detail table.
lcv	int	Line code violation
pcv	int	Path code violation
pfpe	int	Path frame bit errors
poofe	int	Path out of frame errors
les	int	Line errored seconds
pes	int	Path errored seconds
lses	int	Line severely errored seconds
pses	int	Path severely errored seconds
pcses	int	Path consecutive severely errored seconds
puas	int	Path unavailable seconds
ppsc	int	Path protection switch counts
ppsd	int	Path protection switch duration
ppes	int	Path parity errored seconds
pfes	int	Path frame errored seconds
paiss	int	path alarm indication signal seconds
pfbe	int	Path frame bit errors
pepe	int	Path C-bit parity errors
llos	int	Line loss of signal seconds

3. bbdxc_exceptions

This table contains bbdxc messages which are in error.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
ld_dt	datetime	The date and time that the row was inserted into the table.
end_port_nbr	numeric(6)	The last port number in a range of port numbers.
msg_txt	varchar(255)	Actual text of the message as it was received from the LSE.

TABLE 5 (continued)

DS3MU

1. ds3mu_reports

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as 'stamped" by the site controller.
dtl_key	numeric(15)	The key to the ds3mu_detail table. A zero indicates performance nominal and a one (1) indicates a performance incomplete (all NULL).
ld_dt	datetime	The date and time that the rwo was inserted into the table.

2. ds3mu_detail

Near-end M23, near-end C-bit and far-end C-bit application fields are included in the same table.

TABLE 5 (continued)

dtl_key	int		
sii	int	Seconds in Interval	0-900 for 15 min/0-86400 for 24 hr
nis	char(2)	Not in service seconds	0-900 for 15 min/0-86400 for 24 hr
mm	char(3)	Monitoring Mode	PB=Parity bit/FB-Frame Bit
cb	char(2)	C-bit indicator	CBT for c-bit/M23 for m23
cf	char(2)	Change of format	FC=form. change/NC=no change
ipi	int	Incomplete Period Indicator	PI for incom/OK for complete
les	int	Line Errored Seconds	0-900 for 15 min/0-86400 for 24 hr
llos	int	Line Loss of Signal Seconds	0-900 for 15 min/0-86400 for 24 hr
pcv	int	Path Code Violation	0-65535 for 15 min/0-4194303 for 24 hr
pes	int	Path Errored Seconds	0-900 for 15 min/o-86400 for 24 hr
pesa	int	Path Errored Seconds Type A	0-900 for 15 min/0-86400 for 24 hr
pesb	int	Path Errored Seconds Type B	0-900 for 15 min/0-86400 for 24 hr
pses	int	Path Severely Errored Seconds	0-900 for 15 min/0-86400 for 24 hr
pefs	float	Path Percent Err. Free Seconds	000.00% to 100.0%
pbber	float	Path Background Bit Error Rate	00-99 for mm/-06 to -11 ee 15 min/-06 to -13 ee 24 hr
puas	int	Path Unavailable Seconds	0-900 for 15 min/0-86400 for 24 hr
pavl	float	Path Percent Err. Availability	0.00% to 100.0%
psefs	int	Path Severely Err. Frame Seconds	0-900 for 15 min/0-86400 for 24 hr
paiss	int	Path Alarm Indicat Signal Secs	0-900 for 15 min/0-86400 for 24 hr
ne_pcv	int	Path Code Violation - near end	0-65535 for 15 min/0-4194303 for 24 hr
ne_pes	int	Path Errored Seconds - near end	0-900 for 15 min/0-86400 for 24 hr
ne_pesa	int	Path Errored Seconds Type A - near end	0-900 for 15 min/0-86400 for 24 hr
ne_pesb	int	Path Errored Seconds Type B - near end	0-900 for 15 min/0-86400 for 24 hr
ne_pses	int	Path Severely Errored Seconds - near end	0-900 for 15 min/0-86400 for 24 hr
ne_pefs	int	Path Percent Err. Free Second - near end	000.00% to 100.0%
ne_pbber	int	Path Background Bit Error Rate - near end	00-99 for mm/-06 to -11 ee 15min/-06 to -13 ee 24 hr
ne_puas	int	Path Unavailable Seconds - near end	0-900 for 15 min/0-86400 for 24 hr
ne_pavl	float	Path Percent Err. Availability - near end	000.00% to 100.0%
fe_pcv	int	Path Code Violation - far end	0-65535 for 15 min/0-4194303 for 24 hr
fe_pes	int	Path Errored Seconds - far end	0-900 for 15 min/0-86400 for 24 hr
fe_pesa	int	Path Errored Seconds Type A - far end	0-900 for 15 min/0-86400 for 24 hr
fe_pesb	int	Path Errored Seconds Type B - far end	0-900 for 15 min/0-86400 for 24 hr
fe_pses	int	Path Severely Errored Seconds - far end	0-900 for 15 min/0-86400 for 24 hr
fe_pefs	float	path Percent Err. Free Seconds - far end	000.00% to 100.0%
fe_ppber	float	path Background Bit Error Rate - far end	00-99 for mm/-06 to -11 ee 15 min/-06 to -13 ee 24 hr
fe_paus	int	Path Unavailable Seconds - far end	0-900 for 15 min/0-86400 for 24 hr
fe_pavl	float	Path Percent Err. Availability	0.0% to 100.0%
fe_psefs	int	Path Severely Err. Frame Seconds - far end	0-900 for 15 min/0-86400 for 24 hr
fe_paiss	int	Path Alarm Indicat Signal Secs - far end	0-900 for 15 min/0-86400 for 24 hr

TABLE 5 (continued)

3. ds3mu_exceptions

This table contains ds3mu messages which are in error.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as a"stamped" by the site controller.
ld_dt	datetime	The date and time that the row was inserted into the table.
msg_txt	varchar(255)	Actual test of the message as it was received from the LSE.

E1MU

The alpha designator is a three character shelf name. The port number is a function of the card number (1-15) and the monitoring point number (1-16)

Port# = ((card number - 1) * 16) + monitoring point number

Therefore port numbers 1-15 are the 15 monitoring points on the first card. Port number 17 would be card 2, monitoring point number 1 and so on.

1. e1mu_reports

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as a"stamped" by the site controller.
dtl_key	numeric(15)	The key to the elmu_detail table. A zero indicates performance nominal and a one (1) indicates a performance incomplete (all NULL).
ld_dt	datetime	The date and time that the row was inserted into the table.
end_port_nbr	numeric(6)	The last port number in a range of port numbers.

TABLE 5 (continued)

2. elmu_detail

dtl_key		
aiss	int	Alarm Indication Signal Seconds
pbber	float	Path Background Block Error Ratio
pber	float	Path Bit Error Ratio
lbes	int	Line Burst Errored Seconds
pbes	int	Path Burst Errored Seconds
rbes	int	Remote Burst Errored Seconds
code	int	Code Error
crc	int	Cyclic Redundancy Checksum error
les	int	Line Errored Seconds
pes	int	Path Errored Seconds
r_es	int	Remote Errored Seconds
ess	int	Service Errored Seconds
fas	int	Frame Alignment Signal error
lofs	int	Loss Of Frame Seconds
llos	int	Line Loss Of Signal Seconds
prbs	int	Pseudo Random Bit Sequence error
rais	int	Remote Alarm Indication Seconds
rebe	int	Remote End Block Error
lses	int	Line Severely Errored Seconds
pses	int	Path Severely Errored Seconds
r_ses	int	Remote Severely Errored Seconds
sses	int	Service Severely Errored Seconds
luas	int	Line Unavailable Seconds
puas	int	Path Unavailable Seconds
ruas	int	Remote Unavailable Seconds
suas	int	Service Unavailable Seconds

3. elmu_exceptions

This table contains elmu messages which are in error.

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment.
port_nbr	numeric(6)	Port number.
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
ld_dt	datetime	The date and time that the row was inserted into the table
end_port_nbr	numeric(6)	The last port number in a range of port numbers.
msg_txt	varchar(255)	Actual text of the message as it was received from the LSE.

OCSU

TABLE 5 (continued)

1. ocsu_reports

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment (shelf name)
mux_lvl	char(4)	MUX level. "3C12"=Imbedded VC-12 data, "OC3^"=OC3 data
port_nbr	numeric(6)	Port number. VC-12: 1-63 = Facility side VC12s 1-63 64-126 = Terminal side VC12s 1-63 OC3: 1 = Facility side OC3 2 = Terminal side OC3
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
dtl_key	numeric(15)	The key to the elmu_detail table. A zero indicates performance nominal and a one (1) indicates a performance incomplete (all NULL).
ld_dt	datetime	The date and time that the row was inserted into the table.
end_port_nbr	numeric(6)	The last port number in a range of port numbers. (see port_nbr above for values.)

2. oscu_detail

dtl_key	numeric(15)	
es	int	VC-12 Errored seconds, mux_lvl = "3C12"
ses	int	VC-12 Severely errored seconds, mux_lvl = "3C12"
uas	int	VC-12 Unavailable seconds, mux_lvl = "3C12"
eb	int	VC-12 Errored blocks, mux_lvl = "3C12"
fe_es	int	VC-12 Errored seconds, far end, mux_lvl = "3C12"
fe_ses	int	VC-12 Severely errored seconds, far end, mux_lvl = "3C12"
fe_uas	int	VC-12 Unavailable seconds, far end, mux_lvl = "3C12"
fe_eb	int	VC-12 Errored blocks, far end, mux_lvl = "3C12"
s_es	int	OC3 Section errored seconds, mux_lvl = "OC3 "
s_ses	int	OC3 Section severely errored seconds, mux_lvl = "OC3 "
sefs	int	OC3 Severely errored framing seconds, mux_lvl ' "OC3 "
s_cv	int	OC3 Section coding violations, mux_lvl = "OC3 "
pcv	int	OC3 Path coding violations, mux_lvl = "OC3 "

TABLE 5 (continued)

3. ocsu_exceptions

site_id	char(3)	Site identifier.
equip_alpha	char(3)	The three character designator for the equipment (shelf name)
mux_lvl	char(4)	MUX level. "3C12"=Imbedded VC-12 data, "OC3^"=OC3 data
port_nbr	numeric(6)	Port number. VC-12: 1-63 = Facility side VC12s 1-63 64-126 = Terminal side VC12s 1-63 OC3: 1 = Facility side OC3 2 = Terminal side OC3
rpt_dt	datetime	Report date and time. The date and time as "stamped" by the site controller.
dtl_key	numeric(15)	The key to the elmu_detail table. A zero indicates performance nominal and a one (1) indicates a performance incomplete (all NULL).
ld_dt	datetime	The date and time that the row was inserted into the table.
end_port_nbr	numeric(6)	The last port number in a range of port numbers. (see port_nbr above for values.)
msg_txt	varchar(255)	Actual text of the message as it was received from the LSE.

TABLE 5 (continued)

Conclusion

While various embodiments of the present invention have been described above, it should be understood that they have been presented by the way of example only, and not limitation. If it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined in the appended claims. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What Is Claimed Is:

1. A system for storing and retrieving performance and topology data of a telecommunications network, comprising:

an open database management system for storing performance and topology data;

a network performance data parser for receiving network performance messages and parsing said network performance messages into performance data;

a network performance data loader for loading said performance data into said open database management system;

a topology data loader for loading topology data into said open database management system; and

a sonet data loader for loading sonet data into said open database management system.

2. The system according to claim 1, further comprising :

a plurality of parsing rules to define a mapping between said network performance messages and said performance data;

one or more performance data files in which said network performance data parser stores said performance data, and from which said network performance data loader retrieves said performance data to load into said open database management system;

a topology data file in which a network real time topology system stores said topology data, and from which said topology data loader retrieves said topology data to load into said open database management system; and

a sonet data file in which a sonet device stores said sonet data, and from which said sonet data loader retrieves said sonet data to load into said open database management system means.

3. The system according to claim 2, further comprising one or more tracking file to store file information on said performance data files.

4. The system according to claim 2, further comprising a placeholder file to store a position in said performance data file at which said network performance data loader is currently processing said performance data file.

5. A method for storing and retrieving network performance data of a telecommunications network, comprising the steps of:

(1) receiving said network performance data; and

(2) loading said network performance data in an open database management system.

6. The method according to claim 5, wherein step (1) comprises :

(1.a) reading a network performance data message;

(1.b) determining whether said network performance data message matches a parsing rule;

(1.c) parsing said network performance data message according to said parsing rule, if it is determined in step (1.b) that said network performance data message matches said parsing rule;

(1.d) reformatting said network performance data message into a reformatted performance message if step (1.c) parses said network performance data message; and

(1.e) writing said reformatted performance message to a performance data file if step (1.d) reformates said network performance data message.

7. The method of claim 6, wherein step (1.e) comprises :

(1.e.1) identifying a performance data file with the most recent time/date stamp;

(1.e.2) determining whether said performance data file that was identified in step (1.e.1) exists;

(1.e.3) creating said performance data file if it is determine in step (1.e.2) that said performance data file does not exist;

(1.e.4) writing said reformatted performance message to said performance data file;

(1.e.5) determining whether said performance data file is full;

(1.e.6) closing said performance data file if it is determined in step (1.e.5) that said performance data file is full; and

(1.e.7) creating a new performance data file if it is determined in step (1.e.5) that said performance data file is full.

8. The method of claim 7, wherein step (1.e) further comprises :

(1.e.8) identifying a tracking file with the most recent time/date stamp;

(1.e.9) determining whether said tracking file that was identified in step (1.e.8) exists;

(1.e.10) creating said tracking file if it is determine in step (1.e.8) that said tracking file does not exist;

(1.e.11) creating an entry in said tracking file; and

(1.e.12) updating said entry in said tracking file to reflect the writing of said reformatted performance message in step (1.e.4).

9. The method of claim 5, wherein step (2) comprises :

(2.a) connecting to said open database management system;

(2.b) retrieving a list of specific monitoring points in said telecommunications network;

(2.c) retrieving a data record from a performance data file, wherein said data record contains network performance data;

(2.d) determining a performance data type of said data record; and

(2.e) writing said data record to said open database management system.

10. The method of claim 9, wherein step (2.c) comprises :

(2.c.1) opening a placeholder file;

(2.c.2) reading an entry in said placeholder file that indicates said performance data file from which to read said data record;

(2.c.3) reading said data record from said performance data file;

(2.c.4) determine whether said performance data file returned an end-of-file while performing step (2.c.3);

(2.c.5) returning said data record if it is determined in step (2.c.4) that said performance data file did not return an end-of-file;

(2.c.6) closing and deleting said performance data file if it is determined in step (2.c.4) that said performance data file did return an end-of-file;

(2.c.7) determining if a second performance data file exists if it is determined in step (2.c.4) that said performance data file did return an end-of-file;

(2.c.8) returning a first data record from said second performance data file if it is determined in step (2.c.4) that said performance data file did return an end-of-file;

(2.c.9) updating said entry in said placeholder file to indicate said return of said data record from said performance data file or to indicate said return of said first data record from said second performance data file.

11. The method of claim 10, wherein step (2.c) further comprises :

(2.c.10) opening a tracking file;

(2.c.11) retrieving a name of said second performance data file from said tracking file if it is determined in step (2.c.4) that said performance data file returned an end-of-file;

(2.c.12) determining if said tracking file returns an end-of-file when retrieving said name of said second performance data file in step (2.c.11); and

(2.c.13) closing and deleting said tracking file if it is determined in step (2.c.12) that said tracking file returned an end-of-file.

12. The method for storing and retrieving topology and sonet data of a telecommunications network, comprising the steps of :

(1) receiving said topology data;

(2) loading said topology data in an open database management system;

(3) receiving said sonet data; and

(4) loading said sonet data in said open database management system.

13. The method of claim 12, wherein step (2) comprises :

(2.a) connecting to an open database management system;

(2.b) retrieving a data record from a topology data file, wherein said data record contains network topology data;

(2.c) determining whether said topology data file returns an end-of-file;

(2.d) determining a topology data type of said data record if it is determined in step (2.c) that said topology data file does not return an end-of-file; and

(2.e) writing said data record to said open database management system if it is determined in step (2.c) that said topology data file does not return an end-of-file.

14. The method of claim 12, wherein step (4) comprises :

(4.a) connecting to an open database management system;

(4.b) retrieving a data record from a sonet data file, wherein said data record contains network sonet data;

(4.c) determining whether said sonet data file returns an end-of-file;

(4.d) determining a sonet data type of said data record if it is determined in step (4.c) that said sonet data file does not return an end-of-file; and

(4.e) writing said data record to said open database management system if it is determined in step (4.c) that said sonet data file does not return an end-of-file.

15. A computer program product for use with a database management system, comprising :

a computer usable medium having computer readable program code means embodied in said medium for enabling a processor to store and retrieve performance and topology data of a telecommunications network, said computer program product having :

first computer readable program code means for enabling a processor to receive network performance messages;

second computer readable program code means for enabling a processor to receive topology data;

third computer readable program code means for enabling a processor to receive sonet data; and

fourth computer readable program code means for enabling a processor to store said network performance messages, said topology data, and said sonet data.

16. The computer program product according to claim 15, wherein said first computer readable program code means comprises :

network performance data parsing means for enabling a processor to receive said network performance messages and parse said network performance messages into performance data; and

network performance data loader means for enabling a processor to load said performance data into said fourth computer readable program code means.

17. The computer program product according to claim 16, wherein said network performance data parsing means further comprises :

a plurality of parsing rules to define a mapping between said network performance messages and said performance data;

one or more performance data files in which said network performance data parsing means enables a processor to store said performance data, and from which said network performance data loader means enables a processor to retrieve said performance data and load said performance data into said fourth computer readable program code means; and

one or more tracking files to store file information on said performance data files.

18. The computer program product according to claim 16, wherein said network performance data loader means comprises a placeholder file to store a position in said performance data file at which said network performance data loader means enables a processor to process said performance data file.

19. The computer program product according to claim 15, wherein said second computer readable program code means further comprises a topology data file in which a network real time topology system stores said topology data, and from which said second computer readable program code means enables a processor to retrieve said topology data and load said topology data into said fourth computer readable program code means.

20. The computer program product according to claim 15, wherein said third computer readable program code means further comprises a sonet data file in which a sonet device stores said sonet data, and from which said third computer readable program code means enables a processor to

retrieve said sonet data and load said sonet data into said fourth computer readable program code means.

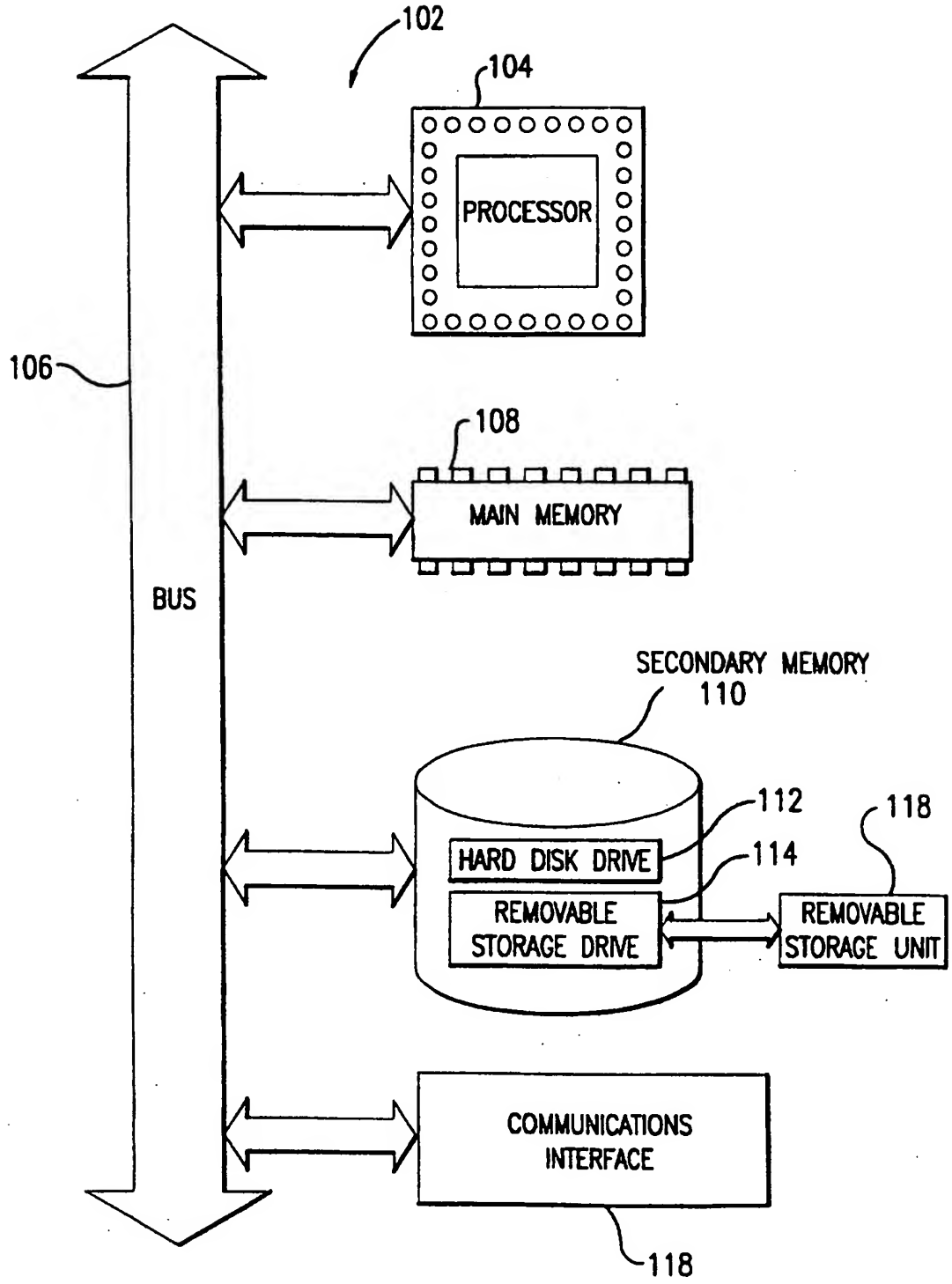
102
104
PROCESSOR
106
108
MAIN MEMORY
BUS
SECONDARY MEMORY
110
112
118
HARD DISK DRIVE
114
REMOVABLE STORAGE DRIVE
REMOVABLE STORAGE UNIT
COMMUNICATIONS INTERFACE
118

FIG. 1

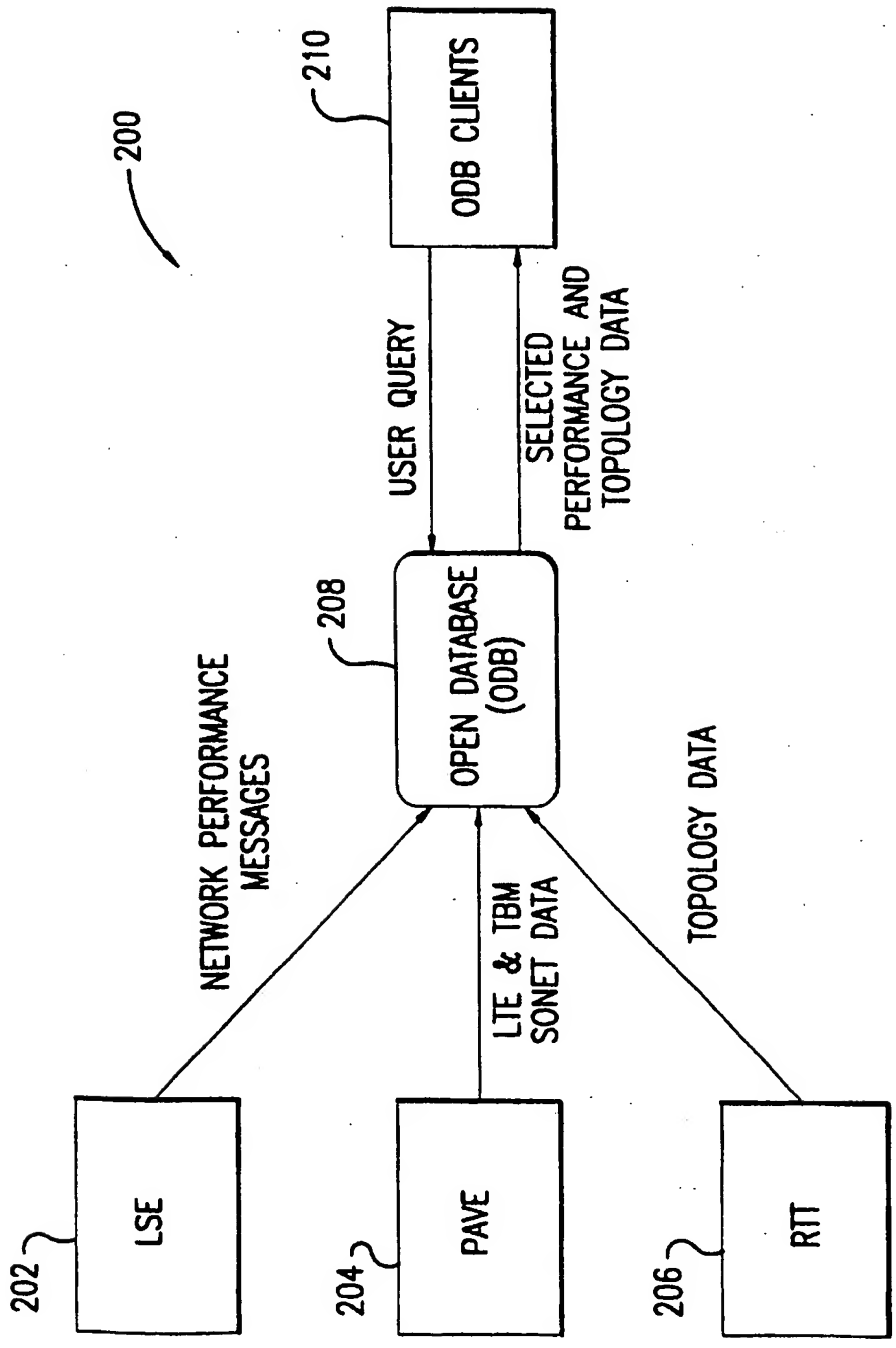
200
210
ODB CLIENTS
USER QUERY
SELECTED PERFORMANCE AND TOPOLOGY DATA
208
OPEN DATABASE (ODB)
NETWORK PERFORMANCE MESSAGES
LTE & TBM SONET DATA
TOPOLOGY DATA
202
LSE
204
PAVE
206
RTT

FIG.2

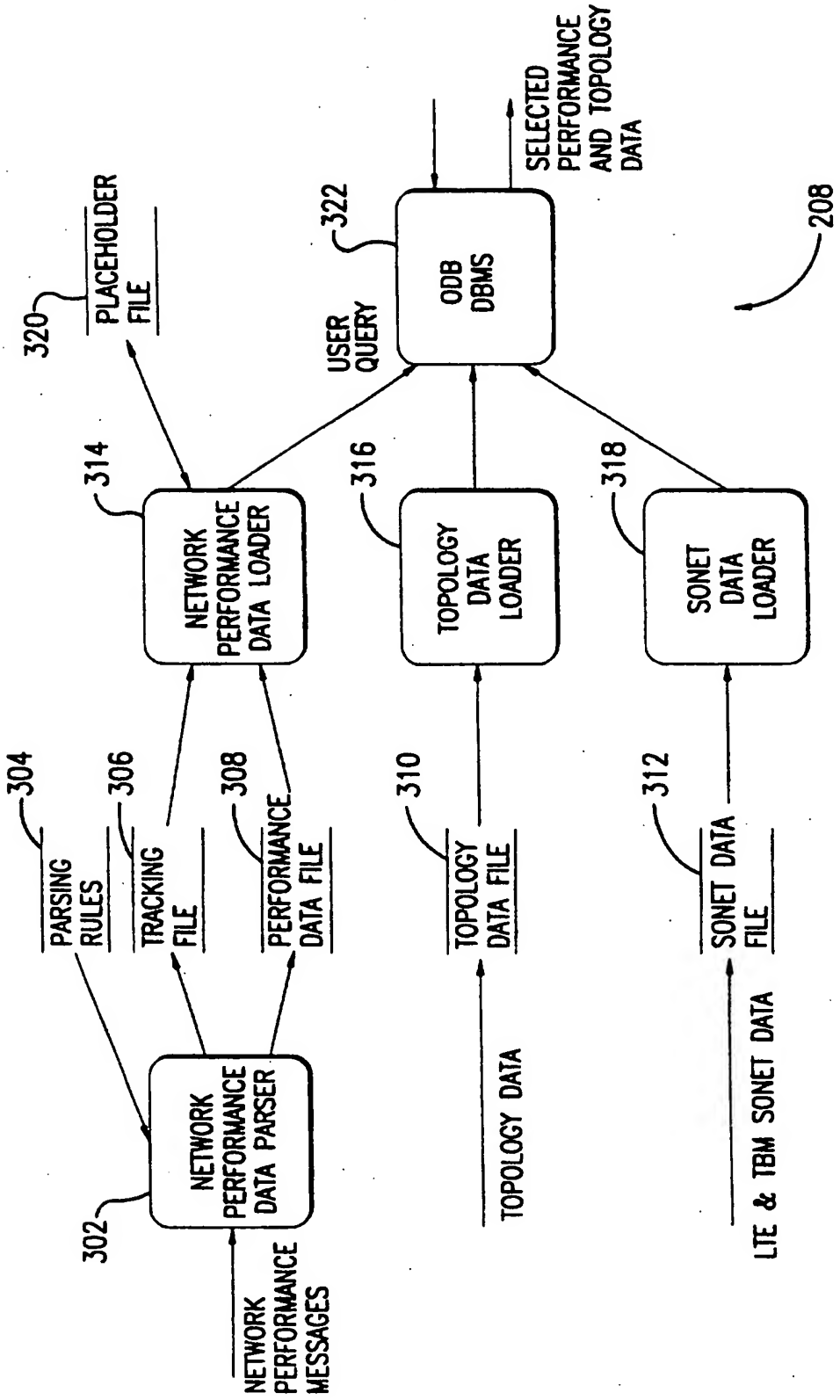
NETWORK PERFORMANCE MESSAGES
302
NETWORK PERFORMANCE DATA PARSER
304
PARSING RULES
306
TRACKING FILE
308
PERFORMANCE DATA FILE
TOPOLOGY DATA
310
TOPOLOGY DATA FILE
LTE & TBM SONET DATA
312
SONET DATA FILE
314
NETWORK PERFORMANCE DATA LOADER
316
TOPOLOGY DATA LOADER
318
SONET DATA LOADER
320
PLACEHOLDER FILE
USER QUERY
322
ODB DBMS
SELECTED PERFORMANCE AND TOPOLOGY DATA
208

FIG.3

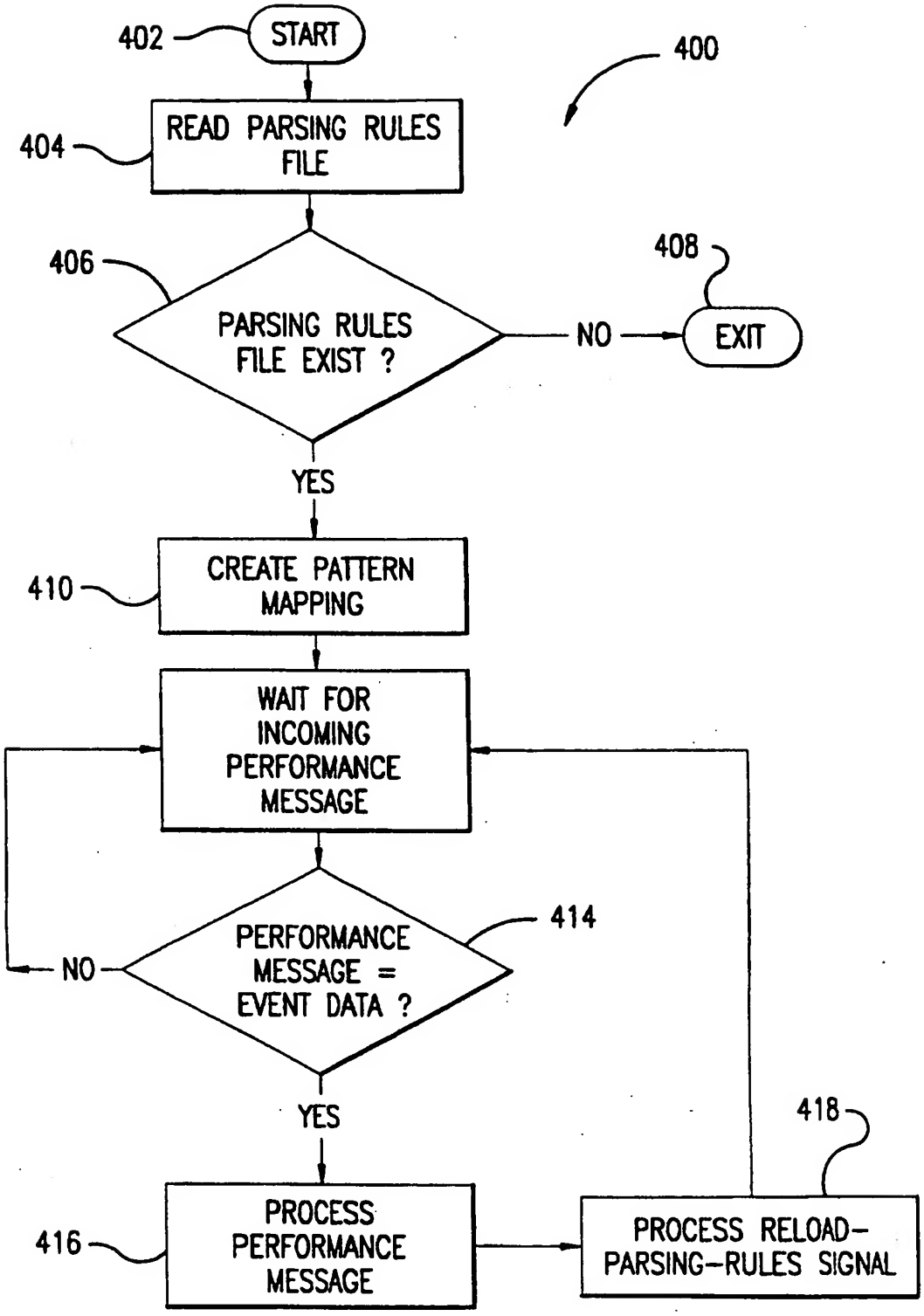
402
START
400
READ PARSING RULES FILE
404
406
PARSING RULES FILE EXIST ?
NO
408
EXIT
YES
CREATE PATTERN MAPPING
410
WAIT FOR INCOMING PERFORMANCE MESSAGE
PERFORMANCE MESSAGE = EVENT DATA ?
414
NO
YES
418
PROCESS PERFORMANCE MESSAGE
416
PROCESS RELOAD-PARSING-RULES SIGNAL

FIG. 4

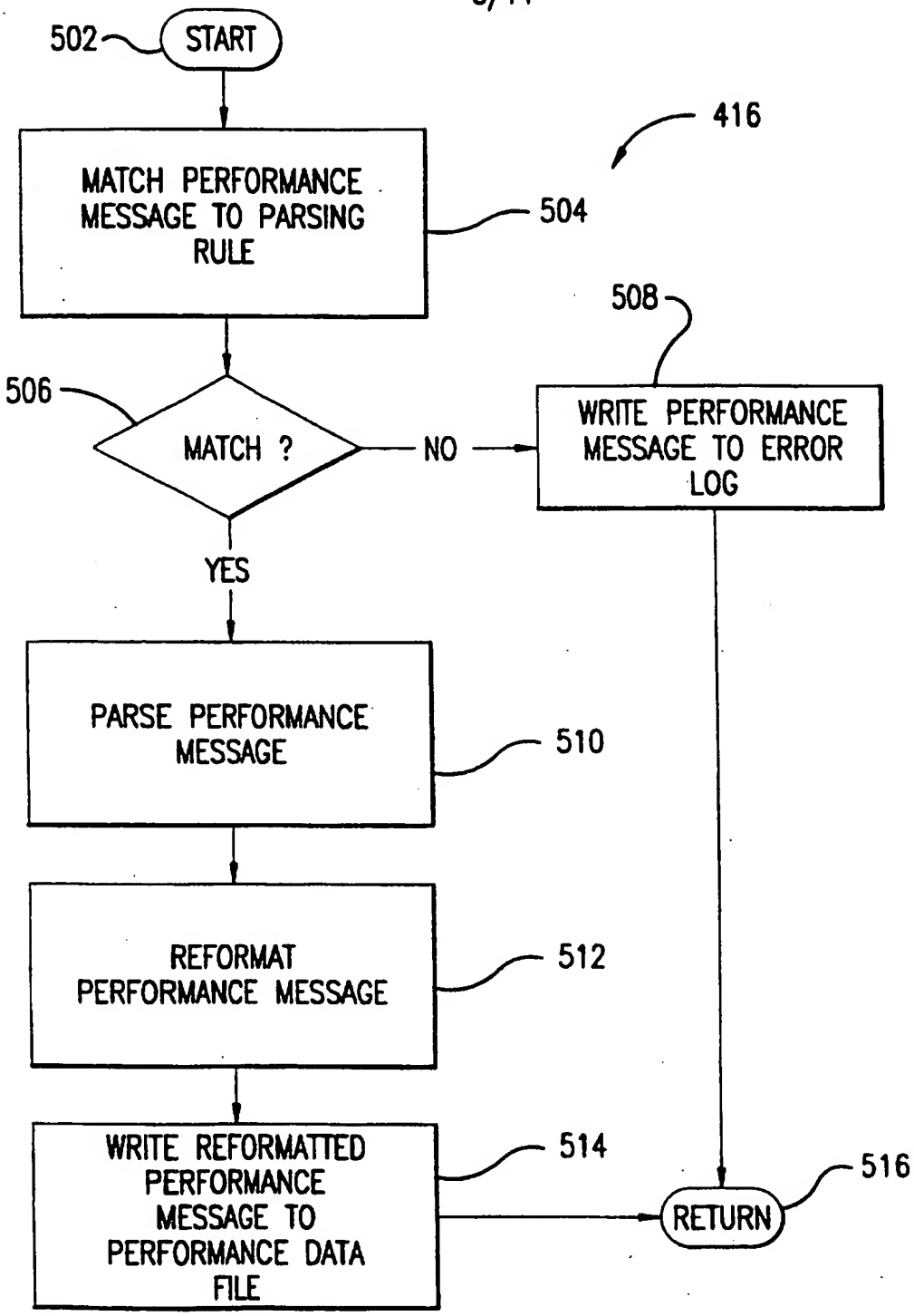
502
START
416
MATCH PERFORMANCE MESSAGE TO PARSING RULE
504
508
506
MATCH ?
NO
WRITE PERFORMANCE MESSAGE TO ERROR LOG
YES
PARSE PERFORMANCE MESSAGE
510
REFORMAT PERFORMANCE MESSAGE
512
WRITE REFORMATTED PERFORMANCE MESSAGE TO PERFORMANCE DATA FILE
514
516
RETURN

FIG. 5

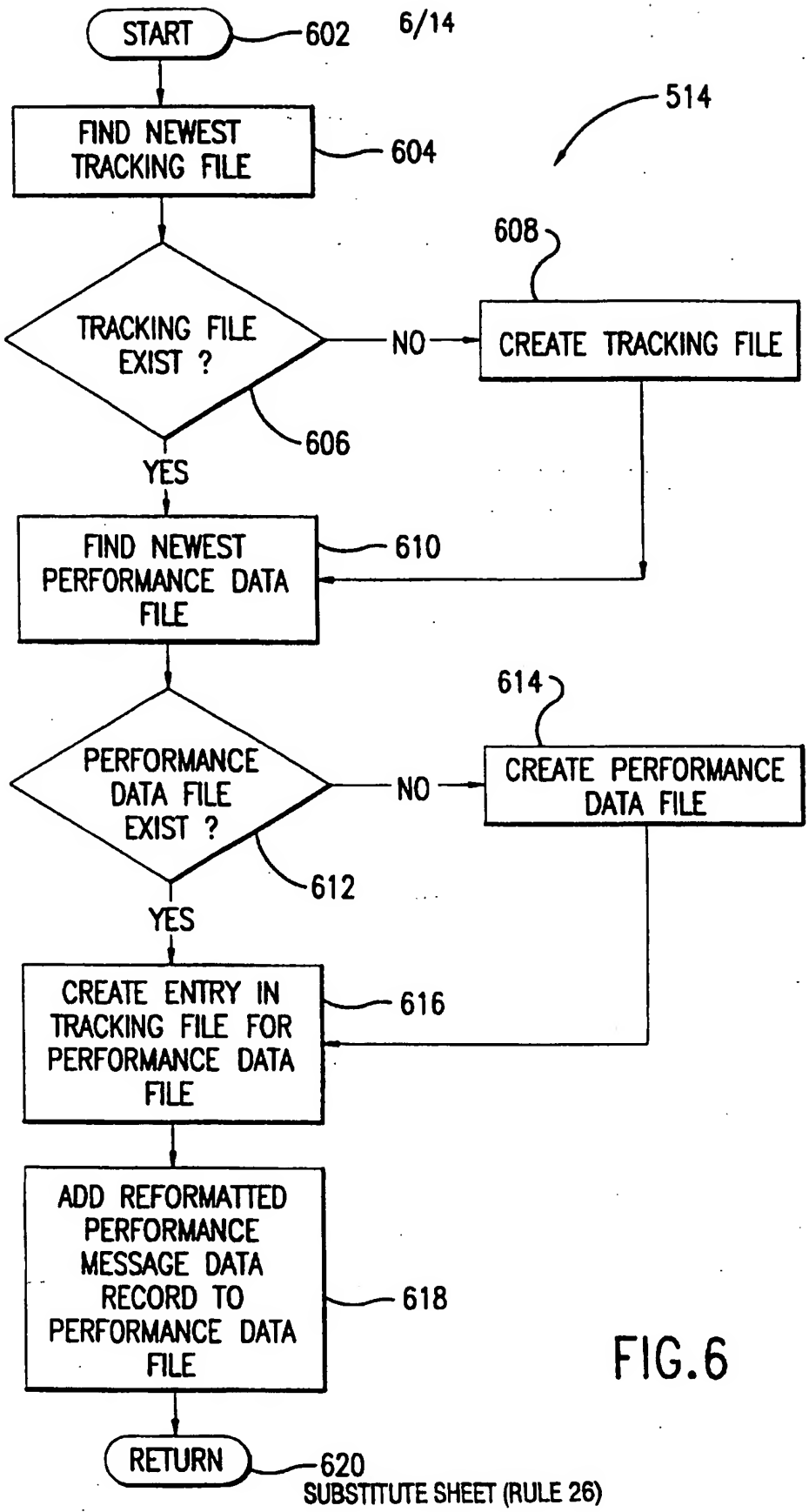
START
602
FIND NEWEST TRACKING FILE
604
514
608
TRACKING FILE EXIST ?
NO
CREATE TRACKING FILE
606
YES
FIND NEWEST PERFORMANCE DATA FILE
610
614
PERFORMANCE DATA FILE EXIST ?
NO
CREATE PERFORMANCE DATA FILE
612
YES
CREATE ENTRY IN TRACKING FILE FOR PERFORMANCE DATA FILE
616
ADD REFORMATTED PERFORMANCE MESSAGE DATA RECORD TO PERFORMANCE DATA FILE
618
RETURN
620

FIG.6

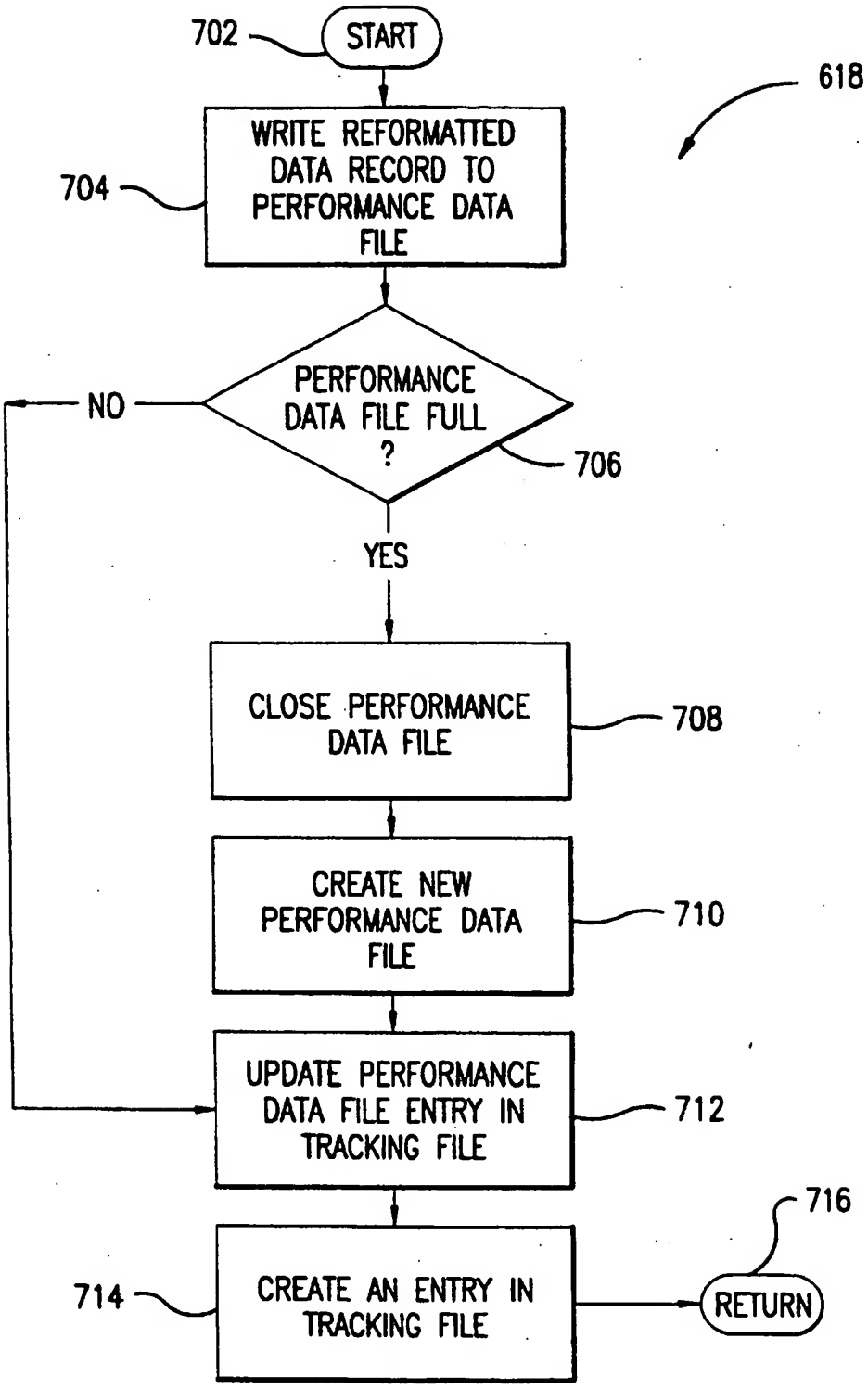
702
START
618
WRITE REFORMATTED DATA RECORD TO PERFORMANCE DATA FILE
704
PERFORMANCE DATA FILE FULL ?
706
NO
YES
CLOSE PERFORMANCE DATA FILE
708
CREATE NEW PERFORMANCE DATA FILE
710
UPDATE PERFORMANCE DATA FILE ENTRY IN TRACKING FILE
712
716
CREATE AN ENTRY IN TRACKING FILE
714
RETURN

FIG. 7

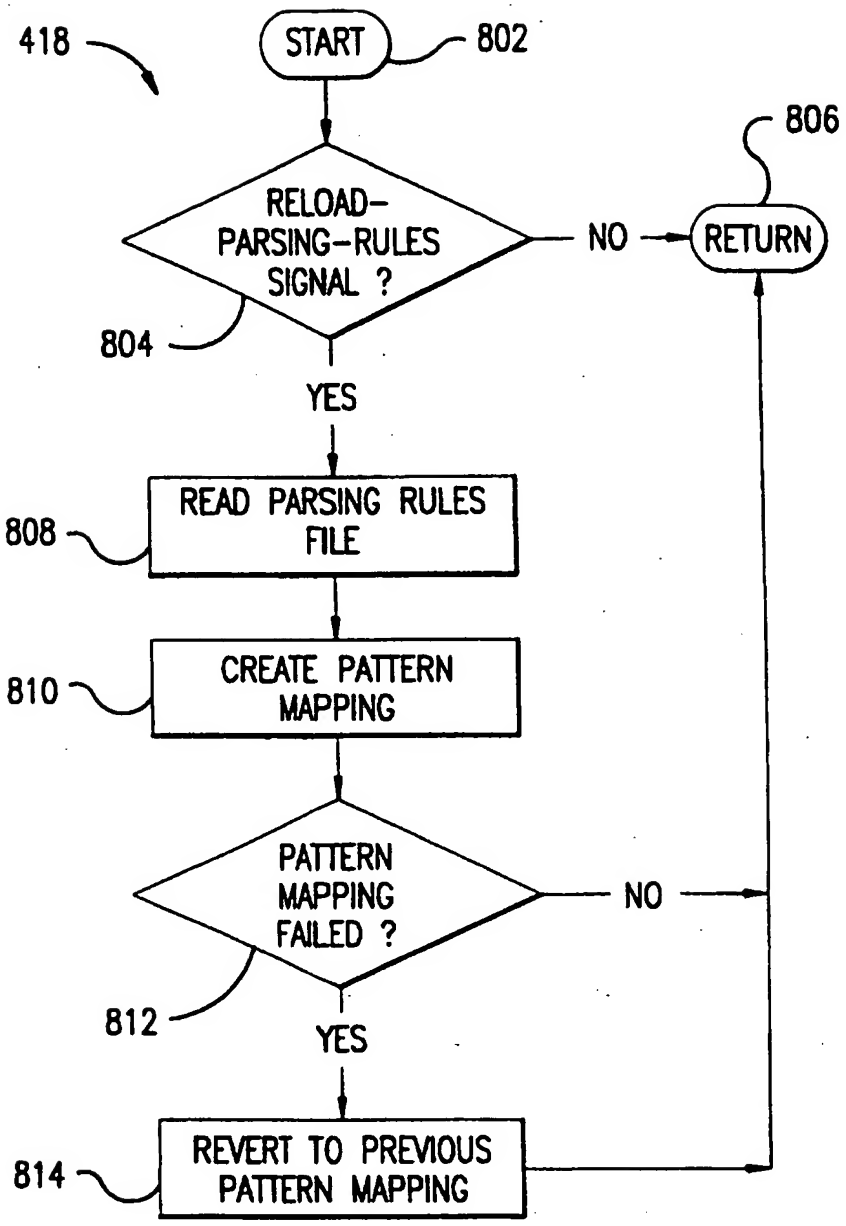
418
START
802
806
RELOAD-PARSING-RULES SIGNAL ?
NO
RETURN
804
YES
READ PARSING RULES FILE
808
CREATE PATTERN MAPPING
810
PATTERN MAPPING FAILED ?
NO
812
YES
REVERT TO PREVIOUS PATTERN MAPPING
814

FIG. 8

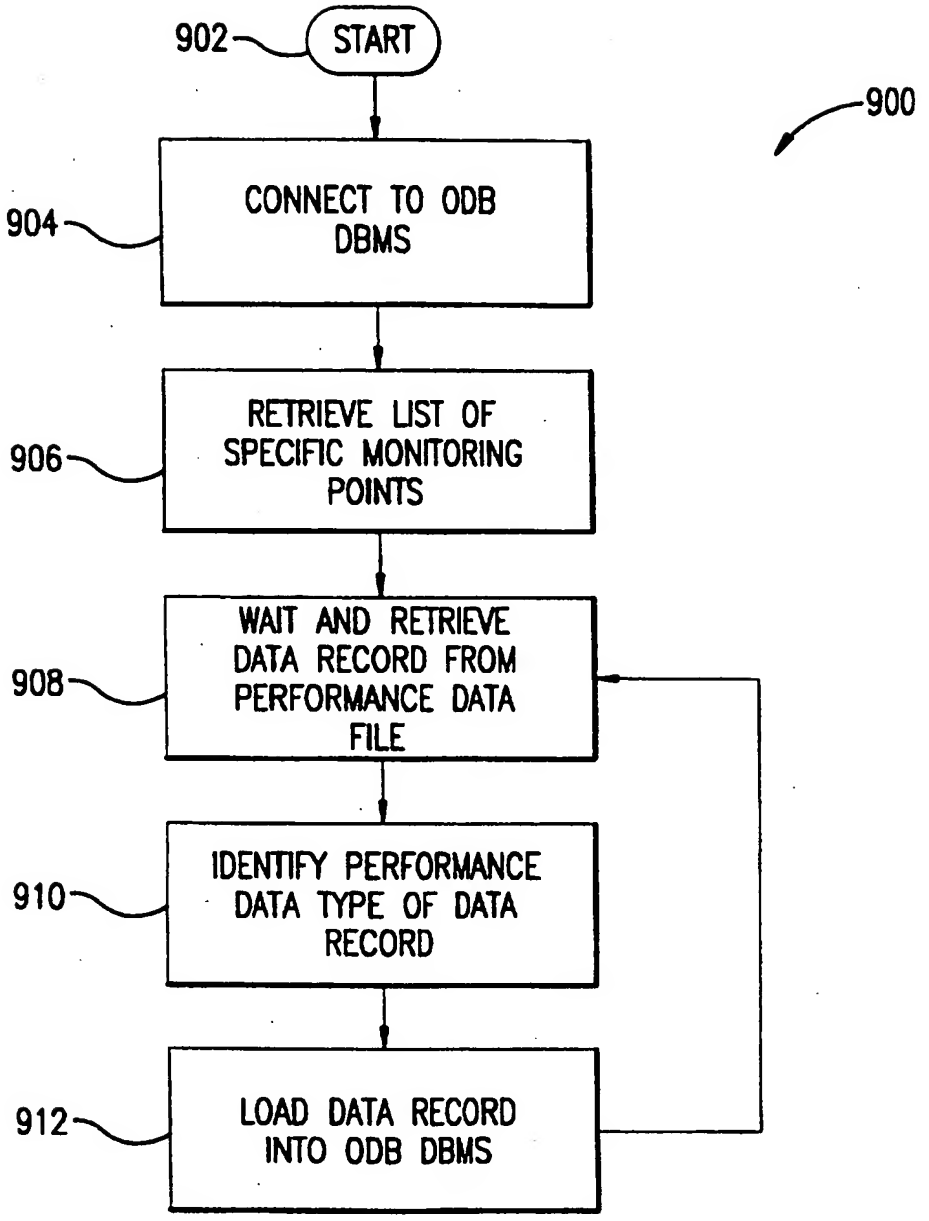
902
START
900
CONNECT TO ODB DBMS
904
RETRIEVE LIST OF SPECIFIC MONITORING POINTS
906
WAIT AND RETRIEVE DATA RECORD FROM PERFORMANCE DATA FILE
908
IDENTIFY PERFORMANCE DATA TYPE OF DATA RECORD
910
LOAD DATA RECORD INTO ODB DBMS
912

FIG. 9

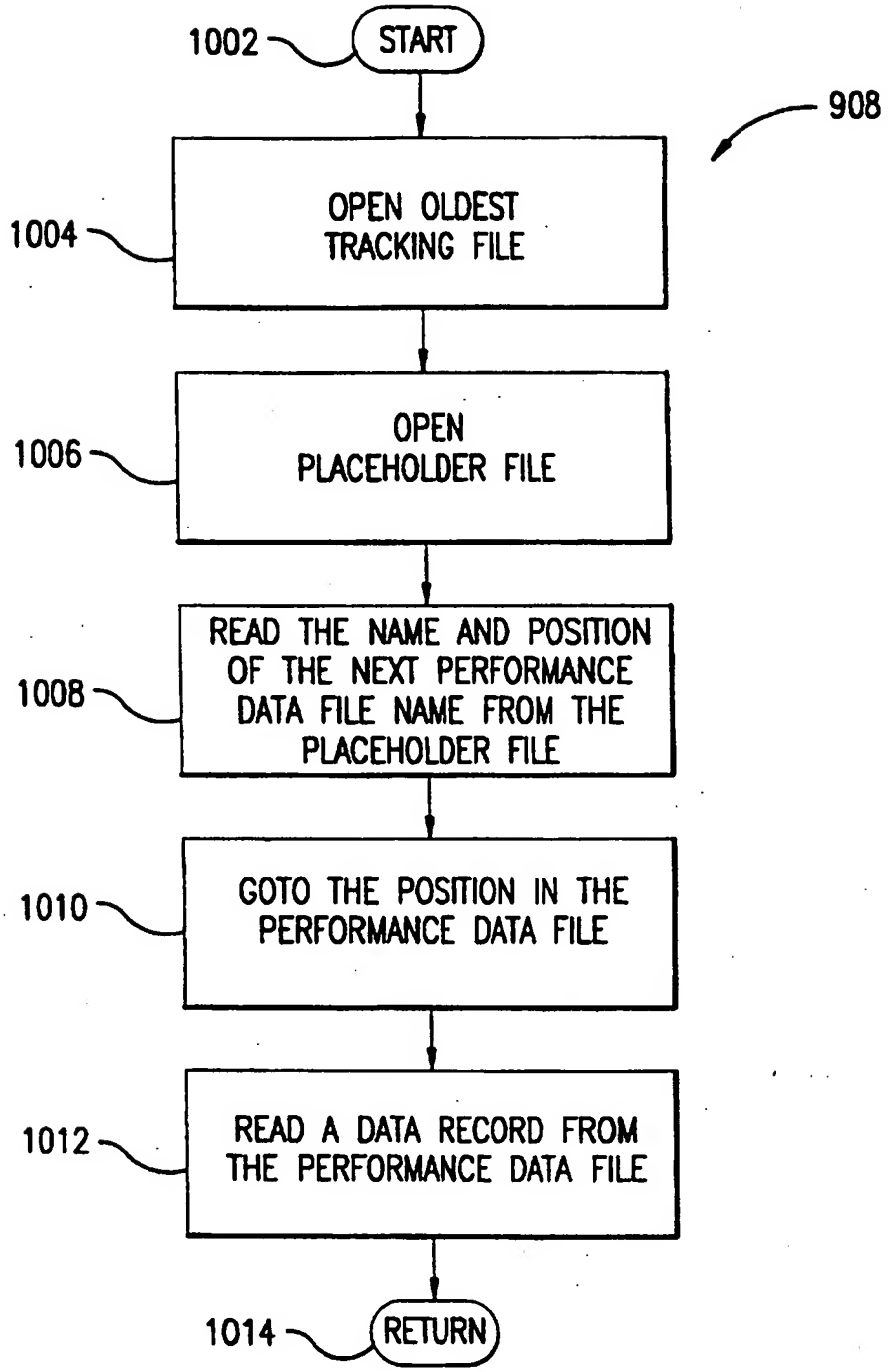
1002
START
908
OPEN OLDEST TRACKING FILE
1004
OPEN PLACEHOLDER FILE
1006
READ THE NAME AND POSITION OF THE NEXT PERFORMANCE DATA FILE NAME FROM THE PLACEHOLDER FILE
1008
GOTO THE POSITION IN THE PERFORMANCE DATA FILE
1010
READ A DATA RECORD FROM THE PERFORMANCE DATA FILE
1012
1014
RETURN

FIG. 10

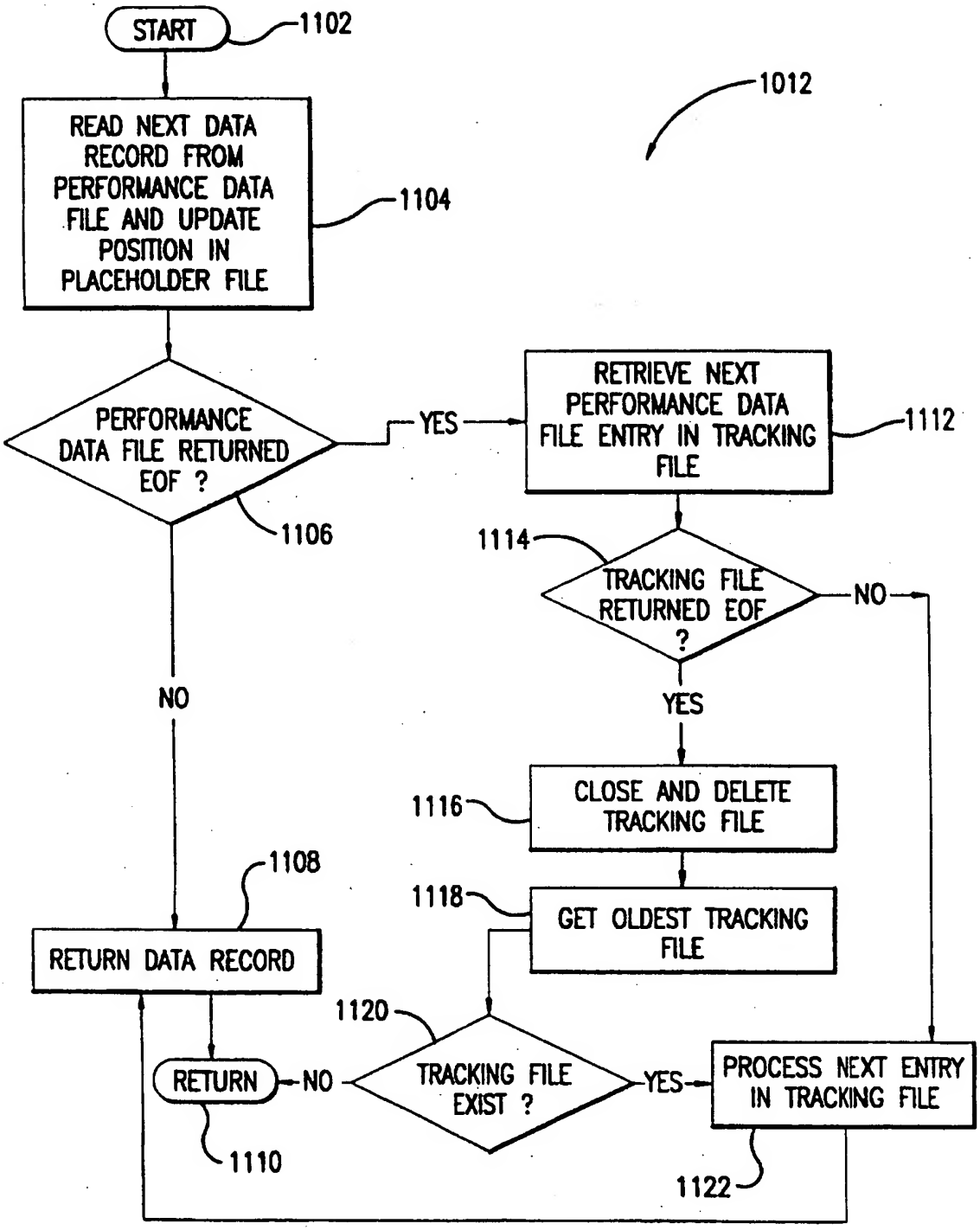
START
1102
1012
READ NEXT DATA RECORD FROM PERFORMANCE DATA FILE AND UPDATE POSITION IN PLACEHOLDER FILE
1104
PERFORMANCE DATA FILE RETURNED EOF ?
YES
1106
RETRIEVE NEXT PERFORMANCE DATA FILE ENTRY IN TRACKING FILE
1112
1114
TRACKING FILE RETURNED EOF ?
NO
YES
NO
CLOSE AND DELETE TRACKING FILE
1116
1108
1118
GET OLDEST TRACKING FILE
RETURN DATA RECORD
1120
RETURN
NO
TRACKING FILE EXIST ?
YES
PROCESS NEXT ENTRY IN TRACKING FILE
1110
1122

FIG.11

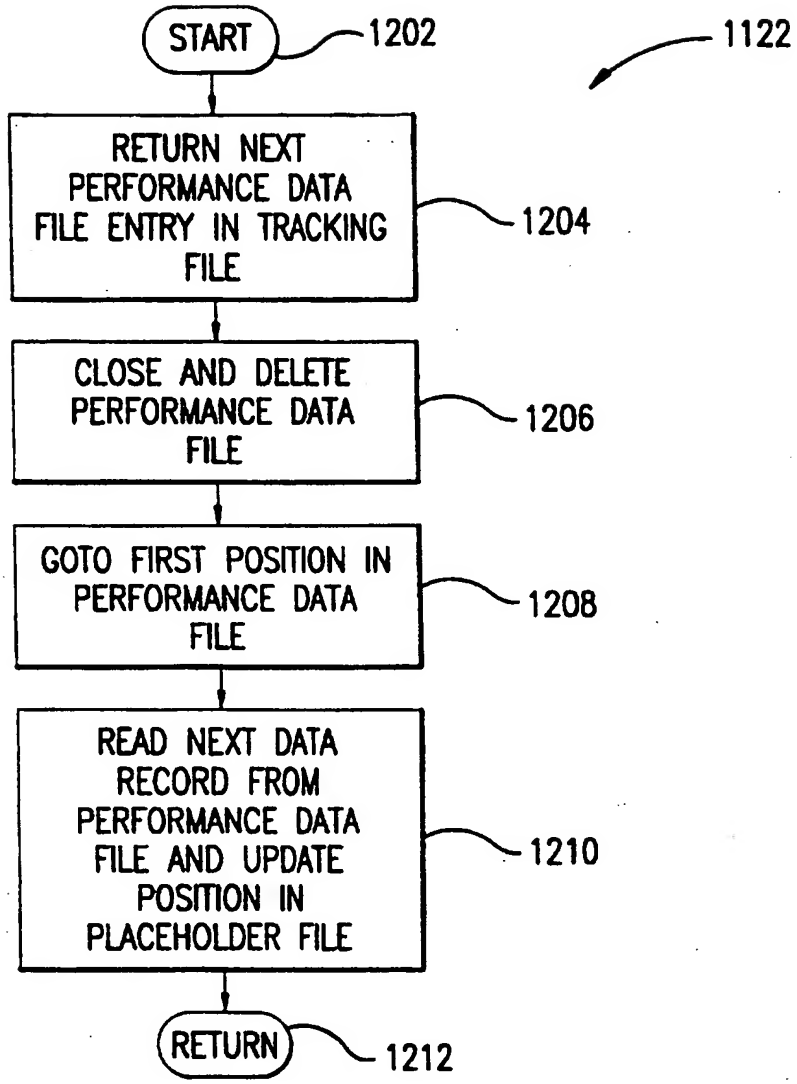
START
1202
1122
RETURN NEXT PERFORMANCE DATA FILE ENTRY IN TRACKING FILE
1204
CLOSE AND DELETE PERFORMANCE DATA FILE
1206
GOTO FIRST POSITION IN PERFORMANCE DATA FILE
1208
READ NEXT DATA RECORD FROM PERFORMANCE DATA FILE AND UPDATE POSITION IN PLACEHOLDER FILE
1210
RETURN
1212

FIG. 12

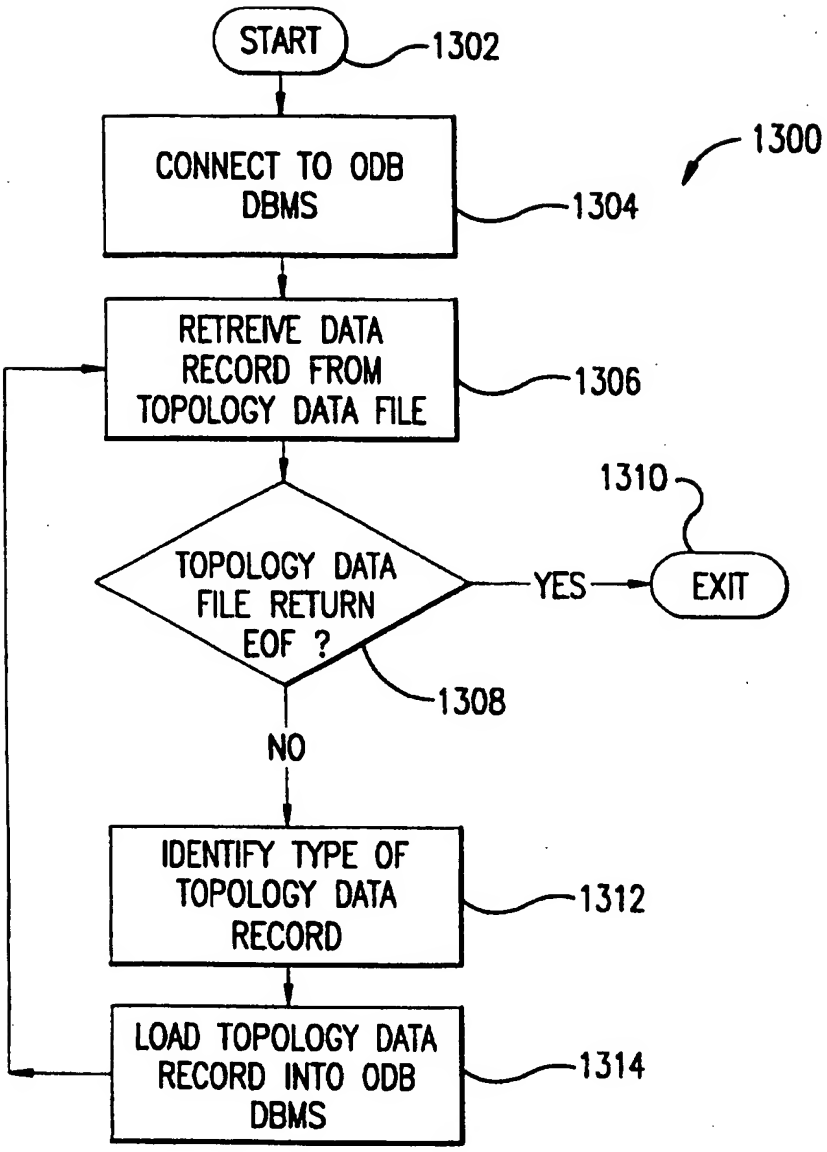
START
1302
1300
CONNECT TO ODB DBMS
1304
RETREIVE DATA RECORD FROM TOPOLOGY DATA FILE
1306
1310
TOPOLOGY DATA FILE RETURN EOF ?
YES
EXIT
1308
NO
IDENTIFY TYPE OF TOPOLOGY DATA RECORD
1312
LOAD TOPOLOGY DATA RECORD INTO ODB DBMS
1314

FIG. 13

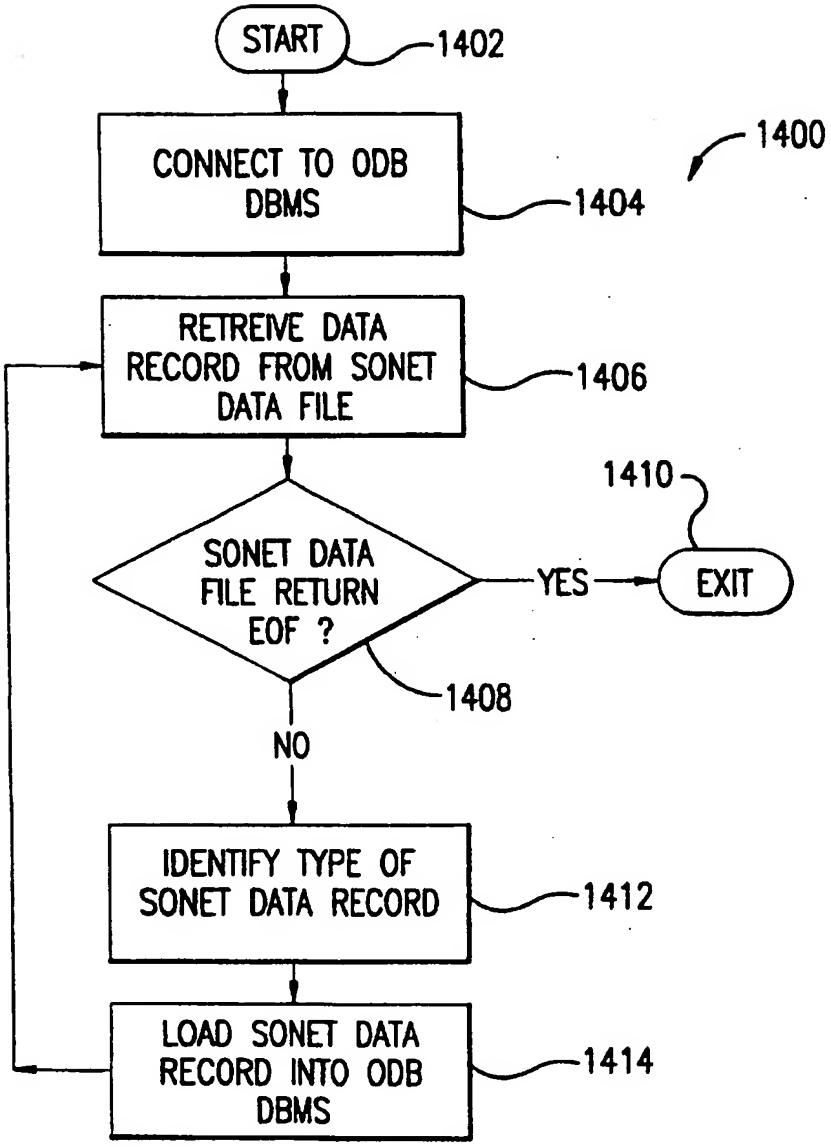
START
1402
CONNECT TO ODB DBMS
1404
1400
RETREIVE DATA RECORD FROM SONET DATA FILE
1406
1410
SONET DATA FILE RETURN EOF ?
YES
EXIT
1408
NO
IDENTIFY TYPE OF SONET DATA RECORD
1412
LOAD SONET DATA RECORD INTO ODB DBMS
1414

FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/09454

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 17/30; H04J 1/16; H04M 1/24, 7/06
US CL :395/610,602,916; 455/9; 364/265,921.8
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/610, 602, 916, 618, 601, 182.13, 180; 455/9; 364/265, 921.8, 266, 944.9

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,287,505 (CALVERT et al.) 15 Febuary 1994, abstract, column 1 lines 1-25 and 56-68, column 2 lines 1-64, column 6 lines 48-66, figure 2, also note claim 1	1-20
Y	US, A, 4,849,879 (CHINNASWAMY et al.) 18 July 1989, abstract, column 1 lines 1-20, column 3 lines 21-62, column 4 lines 50-68, column 5 lines 1-23 and 45-64, figure 2, figures 6 and 7, claim 1	1-20
Y	US, A, 5,446,680 (SEKIYA et al.) 29 August 1995, see whole document	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 14 AUGUST 1997	Date of mailing of the international search report 15 SEP 1997
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Form PCT/ISA/210 (second sheet)(July 1992)*